

# JUST PAINT

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Research Focus:

## CONSERVATION

### OF ACRYLIC PAINTINGS

Working with the conservation community we undertook research in conservation issues of acrylic paints and paintings, desiring a formal understanding of something most acrylic painters might take for granted: That if an acrylic painting gets dirty, it can simply be washed off with a damp rag.

occur. Our results showed that under certain conditions and with certain pigments, washing did not show any visible damage. Future research will investigate more precise conditions, the level of changes that may occur in certain colors or mediums and if, in fact, washing may improve the surface

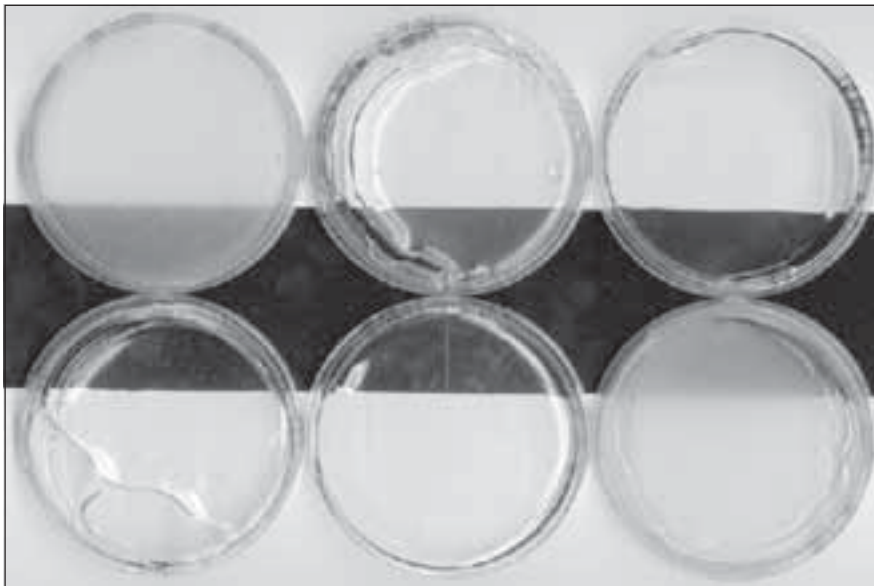


Figure 1: Raw polymer studies in petri dishes from Golden Artist Colors Lab

Just to be clear, we are not currently recommending this practice. Just Paint 5 took a look at conservation cleaning methods currently recommended for acrylic paint surfaces. These remain quite conservative and appropriate for conservators. We have tried to examine more aggressive cleaning techniques that might be practiced by artists and to simply characterize the sort of changes that might

by removing surfactants from the paint surface.

#### *Historical Review*

To secure their rightful position in the historical pantheon of art materials, acrylics must undergo the rigor of research and academic study to ensure our understanding of how to protect and conserve acrylic paintings.

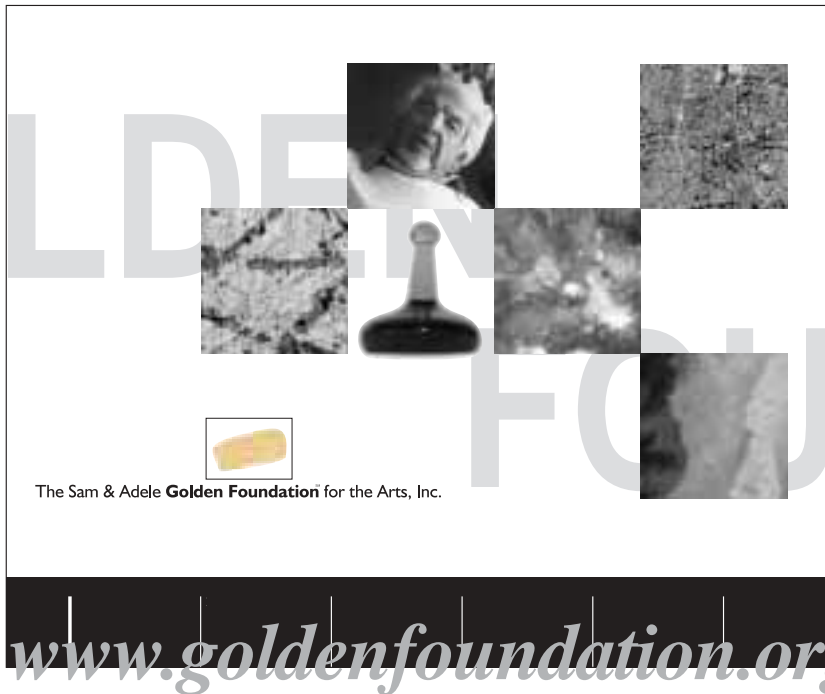
Acrylic Emulsion Paints were

## *Santos: Substance and Soul* Presentation - Acrylic Performance on Wood



Anita Romero Jones  
Our Lady of Guadalupe, 1978  
Courtesy The Albuquerque Museum  
(Museum Purchase, NEA Purchase Grant)  
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In August 2001, the Smithsonian Center for Materials Research and Education (SCMRE) in conjunction with the traveling exhibit "Santos: Substance & Soul," presented a 4 day seminar cosponsored by the Smithsonian Center for Latino Initiatives, College of Santa Fe, the National Hispanic Cultural Center, and the Museum of Spanish Colonial Art. As part of a team of presenters including leading artists, conservators, art historians and paint manufacturer Robert Gamblin, I offered a lecture centered on the issues associated with acrylic paint performance on wood. Preparing samples and getting ready for the presentation, the Research and Development team at Golden had an opportunity to explore the



Many exciting events are unfolding regarding The Sam & Adele Golden Foundation for the Arts, Inc. Last spring in "Just Paint 8", we highlighted the recipients of the very first foundation grants. Now we are pleased to announce the launch of the new web site. It features the rich history of Golden Artist Colors.

This page welcomes viewers. You can keep up to date by viewing details on grants given by the foundation. Applications can be downloaded and printed, or given context by reviewing the foundation's mission. We hope you enjoy this new destination on the world wide web; please visit soon and often.

## Our Community Responds, Appreciation for GOLDEN Service

Three awards have been bestowed upon Golden Artist Colors in the past month. The awards recognized Golden's corporate contributions to the Arts, opportunities created by the company within the community, and the outstanding service of the director of the Golden Foundation.

The New York State Art Teachers Association notified Mark Golden this month that Golden Artist Colors, Inc. was selected to receive the NYSATA Special Citation Award. This is awarded to a corporation that contributes significantly to the cause of art education. It is a common practice at Golden to contribute to statewide art workshops and to offer paint donation for local causes. The company participates in Chenango County's Colorscape event and School to Careers Partnerships. Golden was also cited for the "Just Paint" newslet-

ter distributed to artists throughout the United States. NYSATA states that Golden "supplies an incredible service to art students and teachers and the state organizations wishes to recognize and reward this."

The second award is bestowed upon Lucy Funke, who serves as Director of the Sam and Adele Golden Foundation for the Arts, Inc. which is housed at Golden Artist Colors, Inc. This foundation was established in the memory of Mark Golden's parents and assists artists working in paint. The Alliance of New York State Arts Organizations has chosen Lucy for the M. Jacquie Lodico Service Award. This state wide award honors an arts administrator for outstanding accomplishment and distinguished service to an organization and community. Lucy's efforts appeal to both segments, not only for her current service at

the Golden Foundation, but also for her former twenty years as Director of the Chenango County Arts Council.

The New York State Rehabilitation Association Inc. has named Golden Artist Colors, Inc. as the recipient of the Top Honor 2001 Business/Industry Recognition Award. This award recognizes organizations that are true partners with NYSRA member agencies for employing individuals with disabilities and for understanding and supporting unique challenges these employees face. Golden Artist Colors, Inc. for the past two years has participated in mainsteaming residents of Pathfinder Village to their careers in manufacturing. This has provided a wonderful experience for both the residents and the Golden family of employees who work alongside them.

*"The events of September 11th have the effect of trivializing other issues, including our own work and research. We can take back some measure of meaning by recognizing that our commitment to the preservation of artists' work is also a commitment to our enduring culture." Mark Golden*

## CONSERVATION (CONTINUED)

introduced during the later part of the 1950's. These materials offered extraordinary promise as a revolutionary new artists' medium because of their great clarity, ultraviolet light stability, incredible flexibility, quick drying and of course, water dispersibility.

Acrylic still remains one of the most durable resin systems available for artists. Now that acrylic paintings have achieved a place within the canon of world collections, issues of conservation must be addressed.

It wasn't until the mid-1970's that any conservation articles actively examined acrylic paints. "The Cleaning of Colorfield Paintings," a study

published in 1974 by Margaret Watherston, looked at colorfield paintings, that were created by flooding areas of the cotton or linen canvas with extremely diluted mixtures of acrylic paint and water or solvent. In some places, very low levels of binder were present to hold the pigments in place, leaving the surfaces susceptible to abrasion. Large areas of these oversize paintings were left unprimed leaving vast expanses of raw canvas, prone to yellowing and embrittlement. This delicate construction made the paintings susceptible to changes in appearance with age, prone to attracting dirt and dust, and difficult to clean safely. It is reasonable to expect that these paintings, produced largely with water (or solvent), would be "underbound." Diluting the binder with water makes a more fragile, discontinuous layer, even though the stain will still adhere to the substrate.

Information regarding acrylic conservation techniques was minimal and artists generally assumed acrylic to be simply indestructible. It wasn't until 1990 that new concerns surfaced. Conservators were undoubtedly dealing with the issues of conserv-

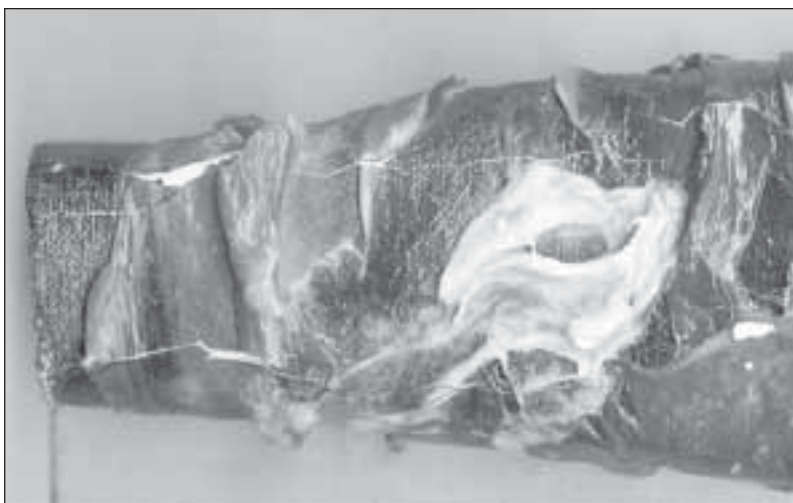


Figure 1: Rolled cracked acrylic painting from Golden lab studies

ing acrylic paintings much earlier, but because it was so new, very few in the field were able to come forth and publish results.

The problems surround two central issues: the sensitivity of acrylics to water and other organic solvents, and their thermoplastic nature. The sensitivity to water and solvents has raised questions surrounding cleaning, repairing and varnish removal from the acrylic. The thermoplastic qualities, (meaning the general softening of the acrylic in high temperatures and the hardening of the acrylic below 45 degrees F) have made storage and moving of acrylic paintings challenging. Even at room temperature, acrylic paintings can remain tacky, causing dirt and airborne pollutants to become bound to the dried acrylic film. In addition, acrylic film remains quite porous, enabling the retention of dirt and any solvents that may come into contact with the surface.

Conservators have recommended a few approaches to cleaning acrylic paintings, namely: mechanically cleaning the surface (which we discussed in Just Paint 5), encouraging preventative conservation, such as framing and putting the work behind glass, or accepting a degree of deterioration without action. These are very limited solutions given the considerable importance of acrylic paintings in recent art history.

In 1992, several articles appeared in the popular press which dismissed all modern materials, including acrylic artist paints. They were written for impact and sensationalism, with

little attention to detail or substance. They simply perpetuated myths surrounding acrylic paints and all modern materials. In fact, some very positive information about the materials provided by scientists in the field was purposely left out of the articles.

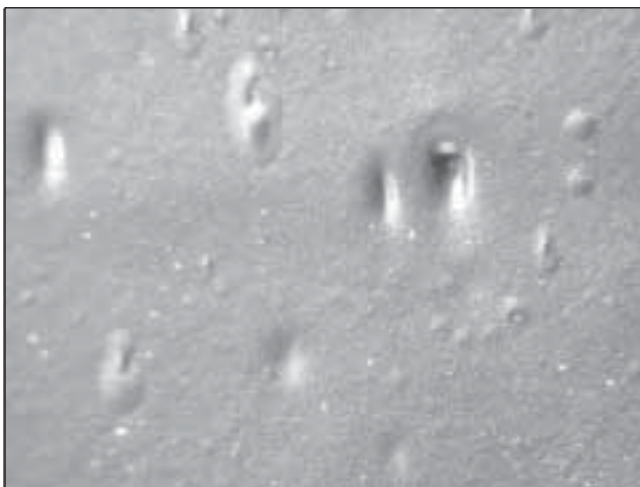
A systematic and learned response to these assertions has been discussed, promised, and advocated through several conferences in which Golden Artist Colors has participated but few projects have been undertaken thus far. Conservators have found the limited existing works extremely helpful including studies by Marion Mecklenburg from the Smithsonian Center for Material Research and Education (SCMRE), studies of acrylic mediums by Dr. Paul Whitmore of the Center on the Materials of the Artist and Conservation Scientist, and Dr. Thomas Learner of the Tate Galleries in London. These studies looked at the effects of temperature and relative

humidity on acrylics, changes in solubility of acrylics over cycles of both natural and accelerated aging exposure, and finally, the movement of additives through acrylic films.

For years, acrylics have been conserved using some of the same methods developed over the last 500 years for oil paints. Golden Artist Colors recognized an opportunity to contribute significantly to the advancement of understanding about acrylics. If acrylics were to be dealt with on their own terms, two things needed to happen. First a review had to be compiled that considered all the critical studies of acrylic paints. This included information from the conservation field and the paint and coatings field in general. We could then offer opportunities for additional studies which we hoped would lead to real options for the conservation community working on acrylic paintings. But more particularly, we felt confident we could develop some best practices for artists working in acrylic.

### *Developing the Tests*

Our comprehensive review of the field included existing data on raw acrylic polymers, the polymerization process, additives and paint formulation, and properties of drying and dried acrylic films.



Bubbles, pinholes, craters

It allowed us to come to some very interesting hypotheses to test. So, beginning in January 2000, we started pulling together the testing protocol for short term and long term testing with the intent of either developing with some possible approaches for acrylic conservation or at a minimum simply characterizing the changes that happen in the acrylic paint during aging, cleaning or conservation. We knew that we would at least be able to start to quantify the changes that occur when artists or conservators begin to clean acrylic paintings.

The hypothesis that followed from our review was: As we (and others) have shown that water soluble additives from the paint are exuding to the surface of the painting, we can improve the properties of the acrylic film if we remove these materials. Although seemingly a very easy idea to test, we are, after well over a year, still at the beginning of this research because of the many variables that need to be controlled.

The first thing we needed to accomplish was to begin to understand the basis for the differences and commonalities in these materials. It is probably obvious to most artists that all acrylics are not alike. Acrylic artist paints are made up of a range of different raw acrylic binders.

These different acrylics may contain different building blocks (monomers) used to create these large polymers. These building blocks may be used in different ratios, creating significantly harder or softer polymers, or possibly altering the lightfastness of the resulting polymer. The

process for building these polymers will also alter the characteristics of the resulting acrylic. Some acrylics are smaller, some much larger, with related differences in characteristics such as gloss and adhesion. And finally just in the raw acrylic itself, there are many different constituents that are used to begin the polymerization process, as well as the addition of other additives. These materials are necessary to change the flow and leveling characteristics of the acrylic, its compatibility with different surfaces, and to add specific attributes, such as advanced adhesion onto leather or plastic substrates.

The type of monomer, the method, and the additives required for polymerization all affect the properties of the final polymer and, thus, the paint. Some are hazier than others, some are more yellow. They have different properties and viscosities and accept pigments and other additives in different ways. The paint formulator must accommodate for these differences. See *figure 1*.

Pigments, the second most important additive, are dispersed into the polymer and have their own sensitivity to water, as well as to other ingredients in the paint formula and other solvents. They also affect the dried paint film through their volume, concentration and their size and shape.

The volatile additives (those that evaporate) contribute essential qualities to the formulation and drying process and, for the most part, leave the paint during drying, though residual amounts may still be present in the dried film. These include the coalescing agents, ammonia and freeze-thaw agents. The nonvolatile additives, (those that don't evaporate) equally necessary to achieve the desired properties of the paint, will remain in the dried film—surfactant, thickeners, defoamers and preservatives. Their presence in the dried film may affect conservation and will need to be

addressed in future research.

Finally, the dried film is extremely varied depending upon the application method, the substrate on which the work was painted, as well as all the other variables mentioned above. Bubbles, pinholes, craters, pigments sitting up on the surface, underbound paints all serve to create an incredibly diverse paint film. At the least, even the most perfectly applied film will contain pores or microvoids. In fact, the porosity of acrylics is acknowledged as positive in some applications for allowing water vapor to pass through the paint film, reducing the risk of delamination. The porosity of the acrylic also provides for the exceptional mechanical adhesion of acrylic paint layers to one another. Of course, a porous paint film in artwork has many implications for painters and conservators. A porous coating may trap air pollution, dirt and foreign matter, encouraging biological growth. This porous film may trap conservation cleaning agents via capillary action, leaving highly concentrated pockets of solvent that can interact with the painting film on a long-term basis, potentially causing weakening of the film.

Considering these variables, we mapped out an approach to begin short term studies to characterize the paint surfaces resulting from altering the conditions of drying, the cleaning process and the substrates utilized. We also embarked on the longer term study to look at the changes which may occur when we remove additives from the surface and how this might effect the aging, mechanical properties, dirt pickup, and visual characterization including color and gloss changes in the paint film.

### **Current Research**

Our current research focused on investigating the role of surfactants. Surfactants are added to the raw polymer to initiate polymer-

## Watching Paint Dry - A way of life at Golden Artist Colors



Bill Berthel, Jim Hayes, and Mark Golden

Golden Artist Colors has been actively involved in research in acrylic paint technology and issues in acrylic paintings conservation for over 14 years. We have contributed research on discoloration of acrylic medium and written many articles on the technical properties of acrylic paint and paint formulation.

These have included understanding the drying process of acrylics, controlling foam in the paints, reviews of current acceptable cleaning alternatives for the acrylic painting surface as well as a review of the paint making process and how that relates to conservation issues. Golden Artist Colors also contributed the chapter in the 14th edition of *The Gardner-Sward Handbook* (also known as the *Paint & Coatings testing Manual*) on testing and evaluation of Artist Paints.

We have formulated two lines of products specifically for conservation needs. These include our MSA paints and our Polyvinyl restoration paints. We have also produced a "Lightfast Testing Kit" for artists and art technologists based on the American Society of Testing and Materials (ASTM) protocols for accurate measurements of the color lightfastness of materials that might be used in artwork.

These projects serve to continue our knowledge of these versatile materials and to continue

to improve our products as well as those of the entire industry.

For the last year and a half we have had the opportunity to work with Elizabeth Jablonski, a talented and dedicated conservator. "The Conservation of Acrylic Dispersion Paintings: A General Overview and Research Proposal" is a project which we feel will have profound implications for the future of acrylic paintings conservation. Ms. Jablonski presented the first portion of the paper in an address to the American Institute of Conservation this past June in Dallas, Texas.

The paper was presented for an audience of conservators and hopefully will be available to those interested parties through the post-conference reprints. For the purposes of "Just Paint" we have rewritten a review, the fundamental conclusions of which may be more relevant to artists than to conservators. Although "Just Paint" is on occasion viewed as "highly technical" rather than generally accessible, we would answer that conservation is an issue of highest importance to artists as well as academics. Actually, we invite anyone with questions about any of the information we supply to call us, we appreciate your input.

# Technical Forum

Your Acrylic Materials questions meet technical expertise

At Golden Artist Colors we want to know what artists are doing and dreaming of trying with our products; and we want to be responsive to inquiries about the technical characteristics of the product.

Our commitment is to offer qualified expertise via artists and paint systems specialists who are familiar with the chemical properties of our product as well as the applications practices of contemporary artists. Whenever possible, we want to speak directly to our users and help them through unique or unprecedented scenarios. That is our promise. We can also guide users to existing information on our website gained through years of research.

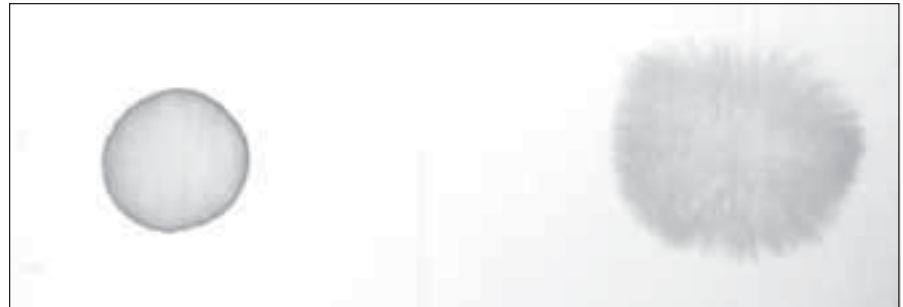
Here are some questions and answers compiled from our phone sessions. You may be looking for this information, or it may inspire a new thought, project, or question. Read, enjoy, and by all means don't hesitate to call us for technical assistance at: 1-888-397-2468.

## ***Which GOLDEN product can be used to attach canvas to a wooden panel?***

We suggest using the GOLDEN Soft Gel as an adhesive for wood to canvas.

While it's not entirely necessary, gessoing both the canvas and wood surfaces to be joined is a good idea for the best possible adhesion. This will help overcome the water repelling nature typical to sized canvas. Gesso treatment will also preshrink the canvas minimizing puckering during the adhesion process.

You may be able to lay the canvas down on a flat table or floor, brush or roller the Soft Gel, and lay the board on top. It can be tricky to apply just the proper



Golden Fluid Acrylic Color thinned with water on Canvas with two Coats of Golden Gesso (Left)  
Golden Fluid Acrylic Color thinned with water on Canvas with two Coats of Golden Absorbent Ground (Right)

amount of gel needed, but try not to apply too much or it may seep out.

It's important for the canvas to be very flat and even. Once the two surfaces meet, press down firmly and turn over. Use a rolling pin or brayer to smooth out the gel and air pockets. Try to remove any gel that seeps out.

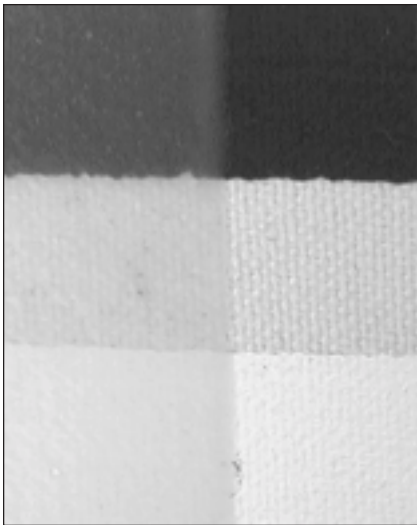
Another technique is more a vertical process. The panel can be attached to a wall (with wood strips attached to the back of the panel and these strips attached to the wall) and gessoed. Then take the previously gessoed canvas and roll it up with gesso side out. Attach the upper edge of the rolled canvas just above the panel (leaving enough to overlap back of panel). Apply the Soft Gel Gloss to the top section (probably no more than a foot down) over the rigid panel, and immediately begin unrolling the canvas to cover this area of gel. As above, use a roller or brayer to roll over canvas surface to be sure all excess gel is pushed out. Continue this process moving down the panel in sections. When finished, it would be best to tack or staple the remaining edges, or assure some weight against the canvas to eliminate curling and lifting. This technique is useful on larger panels where the gel will dry more

quickly than you can apply the canvas.

Once this coating dries, flip the panel over and focus on the flaps. These should also be glued down using Golden Soft Gel. The length of the flaps is up to you, but you probably want to measure for at least a couple of inches on all sides.

## ***What is the difference between a Gesso and a Ground?***

A Gesso can be considered a ground, but a ground does not have to be a gesso. A ground is a product that provides a desired surface on which to paint. GOLDEN makes two grounds: Absorbent Ground and Acrylic Ground for Pastel. The Absorbent Ground (available in white and canvas color) is applied to any gessoed support and mimics the absorbency of a good watercolor paper. The Acrylic Ground for Pastel is a clear product with a gritty solid added to it to allow pastel to adhere to it. The vast array of Gels and Mediums in the GOLDEN line can be used in a similar fashion as grounds, depending on what the artist is trying to achieve. A few examples are: GOLDEN Matte Medium or Fluid Matte Medium can be applied as "clear gessos," allowing the substrate to show through.



Golden Matte Medium over Golden Black Gesso, Raw Canvas, and Golden Gesso

GOLDEN Pumice Gels can be used as is, or blended into colors to create textural grounds.

***Can I use Polymer Medium (Gloss) or Matte Medium as a final varnish?***

When you apply a medium over the paint, it's the same material sans the pigment as the paint itself. While the medium consolidates the sheen, it doesn't really offer any significant protection. The reason for this is that all acrylics are rather porous, and thus can entrap dirt. A painting covered with a medium will not reduce the chance of dust build up, nor will it offer any significant advantage to cleaning, as it is a permanent film. GOLDEN Varnishes however are formulated to be removable, sacrificial coatings, while also offering ultraviolet protection. These come in Gloss, Satin (lower sheen than gloss) and Matte finishes. As the grime builds up (more slowly, as it's a totally different acrylic) it can be stripped off relatively easily with the varnish layer and a new one applied, returning the original depth.

***I have been commissioned to paint a large mural. How do I know how much paint to purchase for the project?***

GOLDEN conducted coverage testing of many of the products commonly used for a mural or large painting. Trying to reproduce "real-life" applications, these materials were brush-applied trying to achieve an even paint film. On average, one can expect approximately 400 square feet per gallon of product, when brushed out in a house paint like application. As the Heavy Body Acrylics are much thicker than a house paint, they resist brushing out as thinly, resulting in less coverage. Another factor that impacts coverage is opacity, as the colors that are intended to be more transparent (like Quinacridones) will not cover as well (sometimes 2 or 3 coats required for coverage). It's important to take into consideration each layer of a mural. The number of priming coats, paint layers, isolation coats and varnish layers, are all things to factor in the estimation. It is also important to consider the main paint colors and estimate their overall square footage. Also, think of how much blending may be done, and the natural layering occurring in a painting. And finally, consult GOLDEN's Pigment Identification Guide for opacity ratings to factor this into your coverage estimates.

***I used Regular Matte Gel over some images on a collage, and although it's dry it still looks very cloudy. Will it go away?***

Generally speaking - no. GOLDEN does not recommend any matte products be used for collages or other applications requiring translucency. It is important to use Gloss products in such applications, and if a lower sheen is desired, apply a Matte or Satin varnish at the end.

All acrylics in their wet state will have a milky appearance until the majority of water has evaporated from the paint film. This cloudiness is a natural aspect of acrylics and, in most instances, will go away in time. However, if you have waited an appropriate

time for the acrylic film to cure (two days to two weeks, depending on film thickness and environmental conditions), it may be matting solids causing the "milky" or "foggy" appearance. If this is the case, there is not much you can do. This is a tough way for an artist to learn this lesson. Matting solids, the particles of silicates that lower the sheen of a paint film, can obscure underlying paints, especially when used in a thick application. The thicker the film and the more matting solids in the film, the more opaque it will appear. When clarity is critical, it is always better to use gloss gels. The artist can always apply a satin or matte varnish over these films later. Remember that one thin layer of matting solids at the end will still reduce the overall glare, but will have much better translucency than thick layers of matte gels or mediums.

***What is an isolation coat and why is it necessary?***

Before applying the varnishes to an acrylic painting, GOLDEN recommends applying an "isolation coat" over the entire painting for a variety of reasons. The isolation coat separates the painting from the varnish by sealing off any absorbent areas and adding a protective acrylic layer preventing color from lifting if the varnish ever needs to be removed. Even if you think you'll NEVER want to remove the varnish, the isolation coat allows for a more even varnish application, and in cases of varying absorbency, can prevent Satin and Matte Varnishes from "frosting". Frosting occurs when a varnish with matting solids absorbs into the substrate, like gessoed canvas. These solids cannot be absorbed and sit on the surface, now stripped of their varnish resins. Once the film dries, they return to their natural dry state, an opaque white. The isolation coat prevents the varnish from being absorbed, and the result is an even matte finish.

**Santos** (continued)

issues that many artists deal with in working with acrylics on wood surfaces. I personally had the opportunity to learn about the incredible range of materials now used by so many of the Santos working in this traditional devotional form of art. I thank the many presenters for their vast knowledge, dedication and artistry and especially SCMRE and project

leader, Jai-sun Tsang, Senior Paintings Conservator, SCMRE for allowing me to share in this event.

**Acrylic Adhesion on Wood**

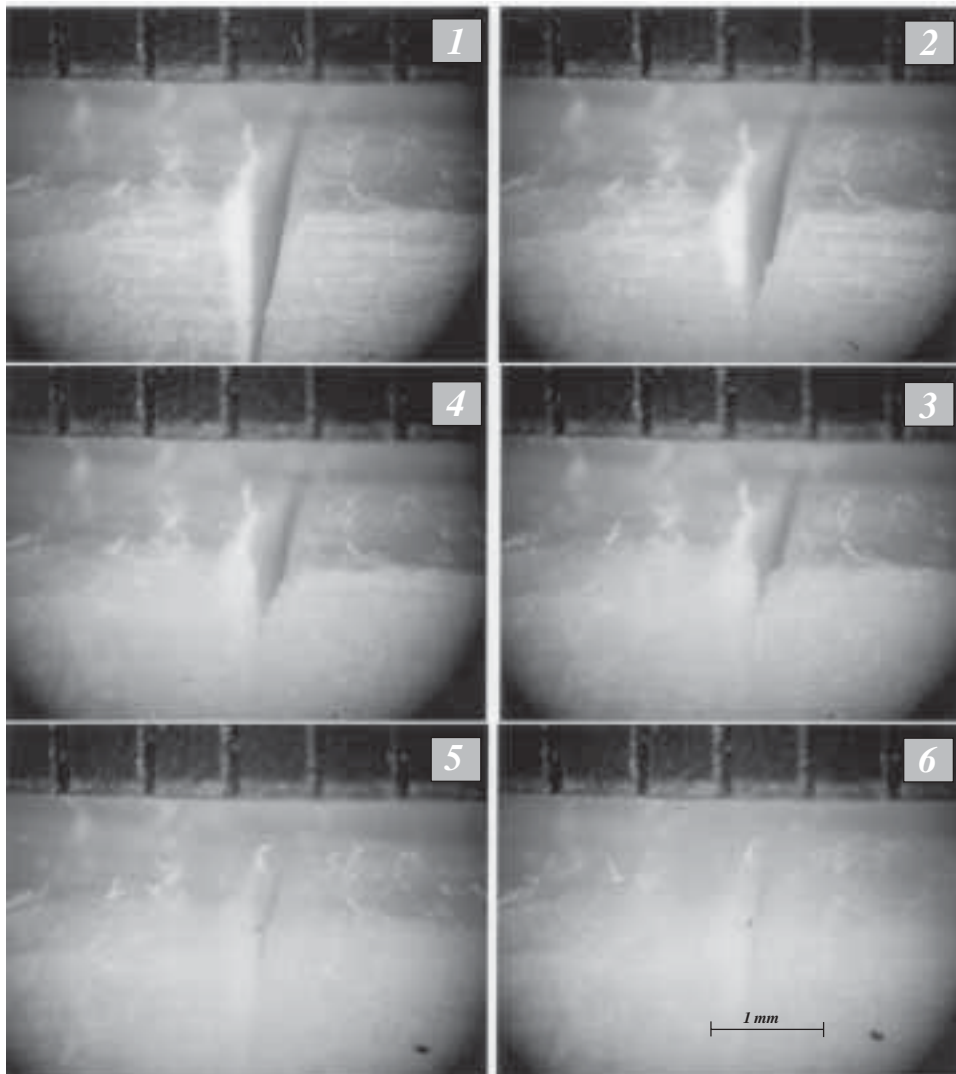
Acrylics have been a recommended choice of paint for a wide range of artists and artisans working with wood. We have had numerous opportunities to engage with artists working in wood

sculpture, carving, furniture and wooden architectural and functional objects, as well as wooden panel painting. In each case the acrylic emulsion paint has provided exceptional working properties, including excellent adhesion, excellent pigment clarity and lightfastness. We have, during our recent research, made a closer examination of the properties and potential of acrylic paints and mediums on wood surfaces.

The most obvious property to discuss is the considerable difference between the emulsion acrylics, which contain water, and the solution acrylics, which are mixed with solvents such as mineral spirits or alcohol, not containing any water.

The acrylic emulsion polymer contains at least 40 percent water before it is formulated into paint. Water may be added to wet out additives and pigments. In every case where water is present in the primer or paint, the water contributes to raising and swelling the wood grain. Even waterbased products recommended specifically as sanding sealers for wood show significant raising of the wood grain. Once the acrylic emulsion paint or medium has swollen the wood, subsequent applications of the waterborne acrylic do not have the same dramatic effect on raising the grain. The dried acrylic tends to hold in place and bonds extremely well to the open grain.

An artist creating work with very fine detailed carving such as hair, feathers, etc. will lose a significant level of detail if a waterbased primer sealer is used. If this level of detail is not required, then the acrylic can be painted



**IMAGES OF A 10 SECOND CLIP:** Water was dropped onto a piece of unsealed Aspen. The 1 millimeter cut groove appears to zip closed as it absorbs the water. The same effect occurs when we add acrylic emulsion directly to wood, no matter the relative hardness or softness of the particular wood or the relative hardness or softness of the particular acrylic emulsion polymer used.



directly onto the wood surface. Acrylic emulsion paints (or what we commonly refer to as just acrylics,) will swell the wood. If this does not detract from the work then it is a very appropriate way to begin. In fact it is possible that the swelling insures great contact and closure of the fibers around the acrylic matrix. When sanding is possible after the first coat, additional coats will create less noticeable texture in the grain.

To avoid raising the wood grain completely, solution acrylics such as the MSA varnish or colors (thinned with mineral spirits) or pigmented shellacs will work quite well. These will offer a sufficient base to then apply the emulsion paints, reducing the effects of raising the grain. Our studies have shown that the nonpigmented shellacs do not offer the same level of adhesion to subsequent applications of acrylic waterborne paints. If it is necessary to use these nonpigmented shellacs in order to maintain some of the wood color, then adhesion can be dramatically improved by sanding the shellac after it has dried. Artists should avoid using multiple heavy coats of shellac.

Another issue facing artists working with wood is the significant staining that can discolor painted surfaces. Not all woods stain to the same level. These effects were quite evident in some woods including cedars and red oak, and with particularly highly staining woods such as orange osage and mahogany. Neither emulsion acrylics nor solution acrylics systems were capable of resisting the discoloration that was caused by oils and water miscible components in the wood being transported through to the surface of the coating. The color change was most noticeable in transparent acrylic colors. Even more disconcerting is some of the blotchy color staining that occurred on

opaque colors.

With these woods the most effective stain blocking was produced by pigmented shellac systems. Commercially these are available in brands such as BIN® and Kilz®. These primers raised the grain very little and were very easy to sand. They are not perfect solutions to the staining of the color but they dramatically improved the situation.

It is understandable that acrylic gesso made with the same waterborne acrylic emulsion will contribute to swelling the wood fibers and will not block the staining. These materials remain porous, allowing water to pass through the film in both directions. In fact acrylic gesso tends to be quite porous and absorbent, thereby increasing the likelihood of surface staining. Woods such as yellow pine can be used successfully with acrylic emulsion paints without developing subsequent discolored staining.

From our work and the recommendations of others we have provided a "best practices" for painting wood: First prepare the wood by sanding or scraping to remove loose fibrous materials and to open the grain of the wood for penetration of the primer. Clean off all dust with a tack cloth that doesn't leave a residue on the wood. Seal the wood with either a pigmented shellac, MSA varnish or solvent pigmented alkyd primer. Let dry and lightly sand. Apply two coats of acrylic gesso for best hiding and surface protection, sanding, if desired, between coats.

At this point any well-made acrylic paint will adhere to the surface. In fact it is likely that an acrylic paint will pull the wood fibers apart before failing.

Finally, some recommendations for working with the acrylic paint: If this surface appears too absorbent for your needs, add additional acrylic polymer to the

gesso mixture, or skim coat with a soft matte or semi-gloss gel. This will allow the colors to glide across the surface avoiding brush drag.

More fluid colors will tend to penetrate the wood or absorbent paint layer, but at this point it is more about aesthetics than properties of the material. A good rule of thumb is that the thinner the paint the greater the interpenetration between coats. Thinner materials will flow into crevices and bridge across surfaces, as do thicker paints.

Acrylics are generally a porous film and can pick up dirt easily when handled. A varnish is therefore an appropriate final coat, especially considering that the work may be in a humid environment subject to mold and mildew. If the artwork is also a functional piece to be handled, we recommend a solvent borne acrylic varnish. This will help the work resist dirt pickup and be more easily cleaned. If the piece is more utilitarian, then painted surfaces may have to be coated with a polyurethane. This would be a strong recommendation for a chair or any object with constant use. Objects that may be used as counters will absolutely require a urethane finish to avoid the blanching that can occur with waterborne acrylic. Some of the waterbased urethanes now resist yellowing. The solvent borne aliphatic urethanes continue to be the most protective, but extreme caution should be exercised because of the range of potentially toxic chemicals used in these urethanes. It is critical that the artist knows that this coating is not removable without damaging the paint. Use of waxes (Renaissance Wax®), or possibly other synthetic varnishes, on the acrylic may also be appropriate and has been recommended by several artists and wood refinishers.

*The Santos presentation was given by Mark Golden.*

ization and they are added to the paint formula to help disperse pigments into the polymer, ease coalescence and help the paint wet-out the substrate upon application. A series of studies in the coatings industry and two of our own studies suggest that surfactants are present at the surface of the dried paint film, rather than (or in addition to) being locked away within the film. The housepaint industry acknowledges that surfactants will be washed away by the rain when the paint is young and that this is desirable because it will reduce dirt pickup and staining and will even-out the surface gloss.

We have chosen to look at the observable effects of washing on the acrylic film under natural and accelerated aging conditions. In our attempt to look at practical solutions we looked at cleaning acrylic painted surfaces with a 100 percent woven cotton cloth.

We used weights to duplicate the pressure that might be used by an adult hand washing off a dusty surface. We used both warm and cold water as well as solvents including ethyl alcohol and mineral spirits. The ethyl alcohol created significant changes in the acrylic film in each test. It clearly smoothed out the acrylic and created traction lines throughout the film. The most surprising results however, were that 20 passes with cold or hot water over the surface, as well as the mineral spirit solvent showed no observable change under magnification. We did detect changes in gloss in the films, with most tests showing an increase in gloss. This would have been expected based on one of two possibilities; we are burnishing the surfaces, or we are removing some of the water miscible additives that find their way to the surface of the acrylic. We did detect under magnification some very random scratches, spaced very far apart. These scratches were on the order of 3-10 microns in width. They occurred no more frequently than

the scratches under tests where we dry rubbed the acrylic surfaces with the cotton cloth. The other significant finding was that certain colors under the water washing left a visible residue of pigment on the wet cloth, specifically the raw umber samples.

Our next step, using the same paint films, was to create conditions that caused an observable change with water. In one series we maintained the same amount of pressure, with 80 passes of the cotton cloth. In another series of tests we doubled the amount of pressure with 40 additional passes. Under these conditions we were able to see changes in the sample with the additional weight. These changes included burnishing of the surface and surface scratches. We were also able to detect water spotting in some of the samples.

We have repeated the washing of these surfaces to continue to look at changes over time and with repeated washing. Of special note is that by the third washing, no residue of pigment was noticeable on the cotton cloth when washing the raw umber. We also saw that the warm water created a significant increase in gloss in the raw umber sample compared to the cold water. Finally, the mineral spirits created a significant burnishing of the surface in both the test with additional passes and those with additional weight.

Our next series of tests looked at the effects of water on the acrylic film. Even a short exposure of just a few seconds will visibly alter the surface of the acrylic. We wanted to examine if these changes were reversible. By placing drops of water on the surface we examined the amount of time required to produce the maximal change in color and swelling of the surface. We determined that 15 minutes was sufficient given the colors we were working with. This created a profound localized swelling and increase in tint of the paint film. Once the water droplet was blotted from the surface, both observable swelling and color

change were reversed within minutes.

Our ongoing series of studies that we hope to report on in the future include dust build up of paint films, blocking (stickiness) before and after aging and washing, gloss and color changes, changes in flexibility and any changes in the film's ability to be affected by water.

### ***Current Observations:***

Although our work is still at the preliminary stages we are quite excited to see the reversibility of the effects of water on the surface of the acrylic films. The most startling result was that there seem to be some conditions of washing the acrylic film that may reduce the possibility of damaging the surface of the painting. We continue to look at the differences in hot and cold water washing. Several studies suggest that warm water is more effective at removing additives from the surface, but work done by Marion Mecklenburg looking at the effects of temperature on the acrylic film suggest that the acrylic becomes much harder in colder temperatures so colder water may reduce potential burnishing of the film. In our tests with raw umber this does seem to be the case. Of special importance to us was seeing that the mineral spirits could be used under certain conditions on the surface without showing changes to the films. This coincides with our assessments of paintings in which the MSA varnish was removed and certainly provides some additional confidence to these empirical results.

Tests need to be conducted on the complete range of acrylic colors to determine which may be more sensitive to washing than others, and what those particular effects are. Photomicrographs showed the wide range of textures within each acrylic color. Tests will continue to look at cleaning dusty surfaces. It is our strong belief that dusty surfaces need to

be cleaned by dry methods as outlined in our JP5 before attempting to wash even the most stable surface. It is likely that dust particles will act as sand paper if they are not sufficiently removed from the surface.

It still remains to be studied if this washing will have an even more positive effect on the painting surface. So before taking your painting in the shower with you, a good deal of additional work needs to be completed before we can make wide sweeping recommendations on cleaning these surfaces, but we are slowly opening up some very promising options to be able to continue to study. Artists are looking for practical solutions

for conservation that offer the best results. We have started our own research in an attempt to look for practical solutions for artists. And when we can't create solutions, at least we will have documented what may happen should you clean or otherwise conserve your own paintings. If we could prove that removing these additives improved the properties of the film, then we could begin to create potential best practices for artists to consider when cleaning. Even if we couldn't show improvement, but only characterized the effects of cleaning, we would still have a tool so that an artist could make their own judgment as to how to proceed on their paintings.

Artists will often call their local museums or art conservator to try to get advice on the best practices for taking care of their work. This advice is generally informed and on target. But we would suggest that sometimes conservators respond to an artist's request with treatments that are well beyond the scope of most artist's abilities and resources. Obviously, this gets more complicated when the painting is purchased, becomes part of a permanent collection, or is otherwise no longer owned by the artist. We hope that our research will prove useful for artists and the conservation community in an ongoing effort to understand the effects of time on our relatively new medium.

#### BIBLIOGRAPHY

1. Erlebacher, Johan D., Eric Brown, Marion F. Mecklenburg, Charles S. Tumosa. 1992a. The Effects of Temperature and Relative Humidity on the Mechanical Properties of Modern Painting Materials. Proceedings of the Materials Research Society Symposium. Vol.267: 359-370.
2. Erlebacher, Johan D., Eric Brown, Marion F. Mecklenburg, Charles S. Tumosa. 1992. The Mechanical Behavior of Artists Acrylic Paints with Changing Temperature and Relative Humidity. In AIC Postprints, American Institute for Conservation Paintings Specialty Group. Washington, DC: AIC. 35-40.
3. Learner, Tom. 1995. The Analysis of Synthetic Resins Found in Twentieth Century Paint Media. SSCR Pre-prints, 2nd Resins Conference, Resins: Ancient and Modern, Aberdeen. Edinburgh: Scottish Society for Conservation and Restoration. 76-84.
4. Learner, Tom. 2000a. A Review of Synthetic Binding Media in Twentieth-century Paints. *The Conservator* 24:96-103.
5. Learner, Tom. 2000b. Personal communication. New York City.
6. Learner, T. and Crook, J. 2000. *The Impact of Modern Paints*. New York: Watson-Guption Publications.
7. Watherston, M. M. 1974. The Cleaning of Color Field Paintings. In *The Great Decade of American Abstraction: Modernist Art 1960 to 1970*. Houston: Museum of Fine Arts. 119-129.
8. Whitmore, Paul M. and Val G. Colaluca. 1995. The Natural and Accelerated Aging of an Acrylic Artists' Medium. *Studies in Conservation* 40 (1):51-64.
9. Whitmore, Paul M., Val G. Colaluca, and Eugene Farrell. 1996. A Note on the Origin of Turbidity in films of an Artists' Acrylic Paint Medium. *Studies in Conservation* 41 (4):250-255.
10. Whitmore, Paul M., Diane Moran, and Catherine Baille. 2000. Shrinkage Stress in Art and Conservation Coatings Based on Synthetic Polymers. *Journal of the American Institute for Conservation* 38 (3):429-441.

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#### To locate an art conservator contact:

The American Institute for Conservation, Finding A Conservator Service  
 1717 K Street NW Ste. 200, Washington, DC 20006  
 Telephone: (202) 452-9545, Fax: (202) 452-9328  
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