

ARCHITECTURAL PLASTICS & POLYMER COMPOSITES in the 21st Century: Design & Preservation of Contemporary & Historic Architecture

March 28–29, 2020

An intensive 2-day conference in Cambridge, MA

Organized by

- Technology & Conservation
- Boston Society of Architects's Historic Resources Committee
- Prof. Mark Goulthorpe, MIT Department of Architecture

An important and valuable meeting for:

- *architects* • *engineers*
- *architectural conservators*
- *building restoration specialists*
- *campus planners*
- *objects and sculpture conservators*
- *construction specifiers*
- *landscape architects*
- *real estate developers*
- *manufacturers and suppliers of components and systems for the preservation, restoration, repair, and/or maintenance of architectural plastics and polymer composites*

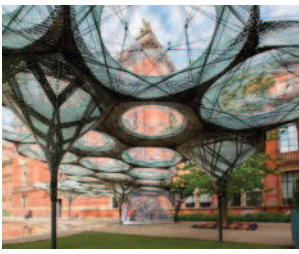
who wish to become better acquainted with:

- the specifying and performance of plastics and polymer composites used now as well as in the past in the construction/fabrication of structures, architectural ornamentation, and works of art
- current design innovations
- the evaluation, care, and treatment procedures for extending the useful life of: building envelopes and/or outdoor sculpture and decorative elements incorporating significant amounts of polymeric materials . . . and

- *operations managers, facilities managers, and administrators of:*
 - *libraries, museums, other cultural facilities*
 - *educational, commercial, and residential complexes*
 - *civic and religious properties*
- *federal, state, and local government officials responsible for the care, rehab, and/or continued viability of buildings and other structures and of public art*
- *construction managers/superintendents*
- *contractors*
- *building maintenance supervisors*

who want to learn about:

- the properties of plastic/polymer-based materials
- how a economically-feasible construction, inspection, and care schedule to preserve structures & decorative components can be developed based on an understanding of the physical, chemical, structural, and other characteristics of polymeric materials and of the environmental stability/sustainability of buildings or artistic works utilizing the material.



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Organized by: • Technology & Conservation • Boston Society of Architects/AIA's Historic Resources Committee
Prof. Mark Goulthorpe, MIT Department of Architecture

MARCH 28-29, 2020

Cambridge, Massachusetts

For centuries natural polymeric materials have been utilized, albeit on a somewhat limited basis, in the construction of structures and cultural properties. However, in the last few decades advances in compounding and fabrication techniques have led to the development of synthetic polymeric materials which can be more fully and successfully used as building materials. These synthetic materials – plastics – are now being utilized in the construction of structures of all types – commercial, cultural, residential, government, religious, health care, and industrial buildings; monuments; bridges; building and decorative components; sculpture and other works of art. And with the introduction of new formulations to existing classes of polymeric materials, even greater flexibility in application, along with improvements in the treatment and care of existing plastic and polymer composite configurations, is achievable.

This important symposium will examine the basic material properties of plastics and polymer composites used in the construction of buildings and in the fabrication of sculpture and other works of art; the role of their mechanical, structural, and other properties on performance/durability; and the effects of environmental conditions on traditional and modern structures that incorporate these materials in their framework, facade/building envelope, and/or ornamentation.

How these materials' characteristics and interactions need to be considered in specifying the materials for new designs and for restoration/preservation projects, particularly as these relate to the sustainability and lifespan of the structures and to the protection/care of buildings that utilize polymeric materials, will be explored.

New developments in fabrication operations and finishes will highlight how modern, innovative manufacturing and installation processes can expand design freedom, adding visual impact and improving sustainability in new construction and artistic projects, as well as can facilitate preservation undertakings. Economic and other factors affecting fabrication, construction, and care will be covered.

Strategies for determining/evaluating deterioration, steps to prevent and/or minimize degradation, and procedures for replicating historic appearance will be explored. In addition, methods for maintaining visual characteristics of existing and new plastic and polymer composite structures, along with energy conservation aspects and protective coatings will be discussed.

Case histories will look at various building types and will examine the lessons learned, vis-a-vis **viable approaches to preservation/maintenance planning, facilities management, and repair/replacement programs, for both old and new structures.** In addition, discussions of new types of polymeric materials and structural design advances will offer a preview of how the built environment's appearance may change . . . and the conservation challenges that may be presented.

All of the sessions are designed to offer attendees valuable insights into the performance and sustainability of plastics and polymer composites in specific environments . . . and the appropriate selection, specification, use, and maintenance of these materials for existing and new buildings and artistic works.

Featured Lecturers

- Glenn R. Bell, PE, SE,** Senior Principal, Simpson Gumpertz & Heger
- Billie Faircloth, AIA,** Partner, Kieran Timberlake
- Prof. Nicholas A. Dembsey, PE, FSFPE,** Worcester Polytechnic Institute, Fire Protection Engineering
- Dr. Michael D. Dimitriou,** Manager, Exponent
- Dr. Rick Duncan, PE,** Technical Director, Spray Urethane Foam Alliance
- John A. Fidler, RIBA, FIIC, FAPT,** John Fidler Preservation Technology, Inc.
- David Fixler, FAIA, FAPT,** Principal, David Fixler Architect
- Eric Goetz,** Chief Technology Officer, Goetz Composites
- Roger Goldstein, FAIA,** Principal, Goody Clancy
- Prof. Mark Goulthorpe,** MIT Department of Architecture
- Andrew Groarke,** Principal, Carmody Groarke
- Erleen Hatfield, PE, AIA,** Hatfield Group
- Craig Hatto,** Director of Design & Creative Experience, Continuum Attractions (former Project Leader, Historic Royal Palaces)
- Mark Hobbs,** Head of Structural Engineering, Premier Composites Technology
- Justin Jin,** CEO, Axia Materials Co., Ltd.
- Dr. Thomas J. S. Learner,** Head of Science, Getty Conservation Institute
- Prof. Roberto Lopez-Anido, PE,** Department of Civil & Environmental Engineering, Advanced Structures and Composites Center, University of Maine
- Rosa Lowinger,** Principal Conservator, Rosa Lowinger & Associates
- Jamie Marina,** Engineering Director, MouldCAM
- Edmund P. Meade, PE,** Principal/Director of Historic Preservation, Silman
- Charles Moore,** Senior Product Development Engineer, 3form
- Dr. Maureen T. F. Reitman,** Corporate Vice President & Principal/Practice Director, Polymer Science & Materials Chemistry, Exponent
- Stephen Selkowitz,** Senior Advisor – Building Science, Lawrence Berkeley National Laboratory, & University of California, Berkley
- Charles Sullivan,** Executive Director, Cambridge Historical Commission
- Prof. Franca Trubiano,** Department of Architecture, Weitzman School of Design, University of Pennsylvania
- Andrew Whalley,** Chairman, Grimshaw Architects
- Dr. Christopher C. White,** Research Chemist-Polymeric Materials Group, Materials & Structural Systems Div., National Institute of Standards and Technology

Conference Committee: Susan E. Schur, Hon. AIA, FAPT, Conference Chair, & Publisher-Editor, Technology & Conservation; W. Lewis Barlow IV, FAIA, Architect, WLB Architects; William G. Barry, Jr., AIA, LEED, Principal, Heritage Planning and Design; Eric Breikreutz, Director, Historic Architecture, National Park Service; Matthew B. Bronski, PE, Sr. Project Manager, Simpson Gumpertz & Heger; Nat Crosby, AIA, Project Architect, Finegold Alexander Architects; David N. Fixler, FAIA, LEED AP, Principal, David Fixler Architect; Jack Glassman, AIA, LEED AP, Historical Architect, National Park Service NER/HACE; Mark Goulthorpe, MOT Department of Architecture; David Hart, AIA, Principal, David Hart Enterprises; John Hecker, Architect; Spencer & Vogt Group; Joseph A. Reis, Wollaston Foundry & Machine; William C. S. Remsen, RA, Chief Preservation Architect, International Preservation Associates, Inc.; J. Stewart Roberts, Principal, Johnson Roberts

Photos: Conference Speakers and others

The conference schedule starts on the next page. The registration form is on the last page.

ARCHITECTURAL PLASTICS & POLYMER COMPOSITES IN THE 21st CENTURY:

Design & Preservation of Contemporary & Historic Architecture

SCHEDULE

SATURDAY, March 28, 2020

- 7:30-8:15am Check-in
8:15-8:50 Welcome – *Susan E. Schur, Hon. AIA, FAPT, President, Technology & Conservation, and Prof. Mark Goulthorpe, MIT Department of Architecture*
- 8:20-8:55 Plastics Then and Now
Billie Faircloth, AIA, Partner, Kieran Timberlake
- 8:55-9:20 The Monsanto House of the Future: A Creative Collaboration in Structural Plastics That Was Ahead of Its Time
Roger N. Goldstein, FAIA, LEED AP, Principal, Goody Clancy, and Glenn R. Bell, PE, SE,F,SEI, Senior Principal, Simpson Gumpertz & Heger
- Developments in Materials, Technology, and Care**
- 9:20-9:50 Properties of Currently Used Plastics for Architectural Applications including PTFE, polyvinyl chloride, polyethylene, polystyrene, polycarbonate, polyurethane, acrylics
TBA
- 9:50-10:10 Potential of Carbon-Polymer Composites and Overview of Properties for Architectural Applications
Prof. Mark Goulthorpe, MIT Department of Architecture
- 10:10- 10:30 Posters & coffee break
- 10:30-10:55 The Applications Challenges: Compounding for Future Use and Selecting Existing Materials for the Design of Building Facades, Roofing, Structural, & Insulation
Dr. Maureen T. F. Reitman, Corporate Vice-President & Principal and Practice Director, Polymer Science and Materials Chemistry, Exponent, and Dr. Michael D. Dimitriou, Manager, Exponent.
- 10:55-11:15 Energy Aspects
Stephen Selkowitz, Senior Advisor for Building Science, Lawrence Berkeley National Laboratory, and University of California, Berkeley
- 11:20-11:45 Needed Fire Performance for Life Safety and Property Protection
Prof. Nicholas A. Dembsey, PE, FSFPE, Worcester Polytechnic Institute, Fire Protection Engineering
- 11:45-12:00 Q&A
- 12:00-2:00 Luncheon - MIT Samberg Conference Center
- Aspects of Performance and of Design Planning**
- 2:00-2:25 Durability and Service Life Prediction of Plastics & Polymer Composites
Dr. Christopher C. White, Research Chemist - Polymeric Materials Group, Materials & Structural Systems Div., National Institute of Standards and Technology (NIST)
- 2:25-2:50 Conservation and Restoration of the Great Pagoda at Kew: The Re-creation & Reinstatement of the Iconic Structure's Lost Dragons through Research, Craftsmanship, and Innovation
Craig Hatto, Director of Design & Creative Experience, Continuum Attractions (former Project Leader, Historic Royal Palaces)
- 2:50-3:05 PVC for Exterior Features of Historic Structures: Suitability and Compliance with Regulations
Charles Sullivan, Executive Director, City of Cambridge
- 3:05-3:40 Conservation of Plastic Works of Art – *Rosa Lowinger, Principal Conservator, Rosa Lowinger & Associates*
- 3:40-3:55 Posters & coffee break

Conservation/Preservation of Plastic and Polymer Composite Structures, Components, & Artistic Works of the 19th–21st Centuries

- 3:55-4:10 Large Scale 3D Printing of Thermoplastic Materials for Molds & Formwork in Construction Applications
Prof. Roberto Lopez-Anido, PE, Department of Civil & Environmental Engineering, Advanced Structures and Composites Center, University of Maine
- 4:10-4:40 Windows, Skylights, & Translucent Façades
Stephen Selkowitz, Senior Advisor for Building Science, Lawrence Berkeley National Laboratory, and University of California, Berkeley
- 4:40-4:55 Innovative Use of ETFE: The Roofing and Façade of the Mercedes Benz Stadium in Atlanta
Erleen Hatfield, PE, AIA, Hatfield Group
- 4:55-5:10 Preservation and Replication of Buckminster Fuller's Fly's Eye Zone
Eric Goetz, Chief Technology Officer, Goetz Composites
- 5:10-5:35 Research on Testing & Conserving Plastic Works of Art: The POPART Project and Current Programs
Dr. Thomas J. S. Learner, Head of Science, Getty Conservation Institute
- 5:35-5:50 The Eden Project: Structure and Performance
Andrew Whalley, Chairman, Grimshaw Architects
- 5:50-6:05 Weathering of GRP: Field Assessments and Surveys
John A. Fidler, RIBA, FIIC, FAPT, John Fidler Preservation Technology Inc.
- 6:05-6:25 Q&A
- 6:30-8:10 Reception - Cambridge Marriott Hotel

SUNDAY, March 29, 2020

- 7:30-8:00 am Videos - Case Histories:
New Technologies and Innovations in Design
- 8:00-8:25am Plastics/Polymer Composites Used in Combination with Other Materials
David Fixler, FAIA, FAPT, Principal, David Fixler Architect
- 8:25-8:55 Substitute Plastics/Polymer Composites for Structural and for Exterior Ornamental/Decorative Components
Edmund P. Meade, PE, Principal and Director of Historic Preservation, Silman
- 8:55-9:10 Innovative Exteriors: Maggie's Merseyside and The White Cube
Andrew Groarke, Principal, Carmody Groarke
- 9:10-9:35 Advances in Plastics and Polymer Composites Fabrication
Justin Jin, CEO, Axia Materials Co., Ltd.
- 9:35-10:05 Finishes - Paints and Coatings
TBA
- 10:05-10:25 Posters & Coffee Break
- 10:25-10:45 Olivetti Center Case History
TBA
- 10:45-11:00 The British Film Institute, Southbank's New Canopy
Andrew Groarke, Principal, Carmody Groarke
- 11:00-11:25 Herman Miller Factory and Other Case Histories
Andrew Whalley, Chairman, Grimshaw Architects
- 11:25 -11:45 Spray Foam Roofing
Dr. Rick Duncan, PE, Technical Director, Spray Urethane Foam Alliance
- 11:45-12:00 Q&A
- 12:00-2:00 Luncheon – MIT Samberg Conference Center

Schedule for March 29 continued on the next page

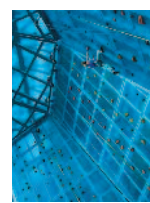
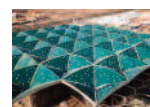
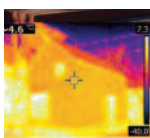
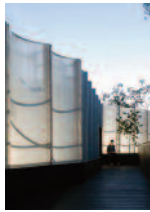




Schedule for March 29 (continued)

Bringing Architectural Plastics and Polymer Composites into 21st Century Architectural Design & Ornamentation

- 2:00-2:15 pm Energy Retrofit of Existing Structures: The Three-Liter House in Germany, The One-Liter House in England, & Other Buildings
TBA
- 2:15-2:45 Health Risks of Polymeric Materials and Policy Needs
Prof. Franca Trubiano, Department of Architecture, Weitzman School of Design, University of Pennsylvania
- 2:45-3:00 Protective Coating Case History
TBA
- 3:00-3:20 Posters & coffee break
- 3:20-3:35 Rice University Cambridge Office and Parking Garage: Printing on Coated PES Tensile Mesh
Billie Faircloth, AIA, Partner, Kieran Timberlake
- 3:35-3:55 Acrylic and Polycarbonate Panels
Charles Moore, Senior Product Development Engineer, 3form
- 3:55-4:20 Cladding Projects
Jaime Marina, Engineering Director, Mouldcam and Shape Shell
- 4:20-4:45 Roofing and Dome Projects - the Holy Prophets Mosque's Sliding Domes, the Steven Jobs Theatre Pavillion, and the Medinah Station Concourse Roof
Mark Hobbs, Head of Structural Engineering, Premier Composites Technologies
- 4:45-5:20 Implications of Using Plastics and/or Polymer Composites in the Construction, Fabrication, and Care of Structures: Anticipated Changes in Methods and Possible Mistakes
Panel, TBA
- 5:20-5:45 "Lightning" talks including The Carbon House Project
Prof. Mark Goulthorpe, MIT Department of Architecture, and others TBA
- 5:45-6:00 Q&A



MONDAY, March 30, 2020 – Optional program

8:00am-2:00pm Tour (optional) – Bus tour with visits to facilities such as a plastics additive manufacturing operation and a projects innovation center; plus viewing of buildings using plastics for exterior envelope, canopy, etc. (No charge for conference attendees.)

CONFERENCE SESSIONS

The conference venues will be on the MIT campus in Cambridge, Massachusetts. The Wong Auditorium where the conference sessions will be held is easily reached by public transportation. (There is very limited parking available near this site.)

Hotel accommodations are attendees' responsibility. However, a number of rooms at the nearby Cambridge Marriott Hotel are available at a special rate (valid til Mar. 6) of \$184+tax per night (single or double room).

- For website bookings, the direct link is:
<https://www.marriott.com/event-reservations/reservation-link.mi?id=1556727796275&key=GRP&app=resvlink>
- For booking through Central Reservations, 1-888-236-2427, the booking code is TCCTCCR

Registration Form

ARCHITECTURAL PLASTICS AND POLYMER COMPOSITES IN THE 21st CENTURY: Design and Preservation of Contemporary & Historic Architecture

Saturday, March 28 – Sunday, March 29, 2020

Prior to Jan. 20, 2020

\$595/person

After Jan. 20, 2020

\$675/person \$ _____

Basic fee covers:

- the 8:00am–6:00pm conference program – Sat., March 28 & Sun., March 29, 2020
- the March 28 and March 29 luncheons, and
- the Saturday evening, March 28, reception

Please indicate any special accessibility or dietary needs:

_____ vegetarian meals _____ other needs

Guest tickets for the March 28 reception can be purchased @ \$50/ticket \$ _____

Optional Program, March 30– no charge for persons registered for the conference

_____ I would like to attend the facilities visits and bus tour program _____

TOTAL \$ _____

Check or money order for \$ _____ U. S. funds (drawn on a U. S. A. bank) for registration fee (and for any guest tickets for the Sat., March 28, reception) is enclosed. Check or money order should be made payable to: The Technology Organization, Inc.

Please register me (us) for the conference:

Name(s) _____

Title _____

Organization _____

Address _____

City, State, Zip/Postal Code _____

Tel: _____ Fax: _____ e-mail: _____

Each person listed on the registration must sign the following statement:

I(we) understand and agree that the participation of Technology & Conservation, The Technology Organization, Inc., conference organizers, and cooperating organizations and individuals in the 2020 “Architectural Plastics & Polymer Composites in the 21st Century” conference is limited to providing educational background and guidance; that all transportation, accommodations, tour, and other arrangements in connection with this Conference are under the exclusive control of others and that Technology & Conservation, The Technology Organization, Inc., conference organizers, and cooperating organizations and individuals have no liability or responsibility whatsoever for the death of any person or for any loss, expense, delay, injury, or other damage to any person or property (however occurring) on, during, and/or in relation to this “Architectural Plastics & Polymer Composites in the 21st Century” conference and the information furnished.

Signature(s) _____ Date _____

**Return this form, with check (made payable to The Technology Organization, Inc.), to:
Technology & Conservation, 76 Highland Avenue, Somerville, MA 02143**

Refund policy: Prior to January 15, 2020 – 100% of the registration fee less \$50 service charge; January 15-February 25, 2020 – 50% of registration fee; after February 25, 2020– no refund.