

ACADEMY OF CERAMICS FORUM 2000

"THE ART OF CERAMICS" The Blend of Art and Science in Technology

Academy of Ceramics Members and their guests convened in Ravello and Sorrento, Italy, to attend the "FORUM 2000" of the Academy of Ceramics.

This was the Academy Third Forum, following Assisi, Italy, 1992 ("Ceramics and Society") and Cracow, Poland, 1996 ("Role of Ceramics in a Self-Sustaining Environment").

Compared to the topical areas discussed in the previous meetings, which realized the main vocation of the Academy, i.e. fostering a deeper understanding of the importance and cultural impact of ceramics science, technology and art within our society, the topic selected for discussion at the 3rd Forum under the heading "The Art of Ceramics: The Blend of Art and Science in Technology" may appear somewhat less general. Nevertheless, it has been purposely selected for its suitability to offer an opportunity for an original approach to enlighten common features and related aspects of the Art of Ceramics, to be intended in its broadest meaning, i.e. embracing an-

thropology as well as applied science and materials processing.

Participation in the Forum of most of the "active" members of the Academy representing practically all European and Overseas Countries bearing significant traditions in ceramics research and manufacturing, gave space to very significant and stimulating scientific presentations and discussions.

The first day's session, chaired by Prof. Dave W. Kingery^{*}, was held in Ravello, a worldwide recognized town perched on a 350 ft high cliff overlooking the Amalfi Coast. After welcome speeches given by Dave Kingery^{*}, the Mayor of Ravello Dr. Secondo Amalfitano, the Academy Council Chairman Dr. Pietro Vincenzini, and by the chairs of the Academy Advisory Committees for "Science" and "Industry and Innovation" Prof. Nils Claussen and Prof. Vladimir Ja. Shevchenko respectively, the scopes of the "FORUM 2000" were briefly outlined by Nils Claussen, chair of the Forum Committee. The winners of the "International Ceramics Prize 2000" for the two sectors "Basic Science" and "Industrial Research" were then presented by Prof. Noburo Ichinose, chairman of the Screening Committee for the Prize. The following winners were appointed.

For the area of "Basic Science":

Prof. Roger A. Naslain (University of Bordeaux, France) for distinguished and creative contribution to basic research on ceramic fibers and ceramic matrix composites. Indeed Naslain' pioneering work on the process of chemical vapour infiltration, and the fundamental understanding derived from it became the basis for scale-up into useful sizes and shapes, and eventually to world-



William Dave Kingery^{*}, third from the left, welcomes delegates at FORUM 2000. From left to right: Noburo Ichinose (Waseda University, Japan) Chairman of the Screening Committee of the "3rd International Ceramics Prize"; Vladimir Ja. Shevchenko (Russian Academy of Sciences, St. Petersburg, Russia) Chairman of the Academy Advisory Committee "Industry and Innovation"; Secondo Amalfitano, Mayor of Ravello; Pietro Vincenzini (National Research Council, Italy) Chairman of the Academy Council; Nils Claussen (T U Hamburg-Harburg, Germany) Chairman of the Academy Advisory Committee "Science" and President of the Scientific Committee of FORUM 2000. Dave Kingery^{*} was asked to chair the Opening Ceremony of the Forum. This was the last meeting attended by Dave before his sudden death.

^{*} Just a few weeks after the FORUM 2000, the International Ceramic Community has been reached by the very sad news that William Dave Kingery suffered a fatal heart attack at his summer home in Wickford, Rhode Island. The FORUM 2000 has been the last meeting attended by Dave in his very intense life of brilliant scientist, devoted educator and marvellous ambassador of good will. Within the several high scopes of his mission, Dave was deeply involved in the Academy of Ceramics from its foundation as a Charting Member and after as the Chairman of the Academy Steering Committee. The Academy decided to dedicate the Official Proceedings of the FORUM 2000 to his memory.



wide commercialization, of ceramic matrix composite (CMC) components now being used in high performance hardware for the aerospace, transportation and energy generation industries.

For the area of "Industrial Research":

Prof. David W. Johnson, Jr. and Dr. John B. MacChesney (Lucent Technologies, AT&T Bell Laboratories, USA) for outstanding achievements in translating sol-gel science into a real technology, and specifically the development of large sized sol derived glass bodies tailored to optical fiber pro-

The Prize Diplomas to Naslain, Johnson, Jr. and MacChesney were handled out by Academy Council Members Dr. Roberto Bossetti, Dr. Ing. Mauro Poppi and Dr. Lorian Bocini, respectively.

The Opening Session ended with the presentation to the Academy of a "Greetings" certificate by Prof. Edwin Ruh on behalf of the American Ceramic Society. Then, delegates were offered the opportunity to visit the gardens of "Villa Rufolo" and "Villa Cimbrone", and to have a magnificent view of the Amalfi Coast.

The technical sessions of the Forum were held at Grand Hotel Nastro Azzurro in Piano di Sorrento located on a hill about 10 kilometers from Sorrento.

The first session was devoted to presentations given by Prize Laureates:

- Prof. Roger Naslain: "Ceramic Matrix Composites Processed by CVI: Highly Tailorable Non-Brittle Ceramics for Thermostructural Applications"
- Dr. John MacChesney: "Technology Foundations for Large Sol-Gel Silica Monoliths"
- Prof. David W. Johnson, Jr.: "Processing of Colloidal Silica Sol-Gel Bodies for Optical Fiber Applications"

The second session on June 6 afternoon, as well as the working session of June 7 and 8, were dedicated to the presentations of the Invited Lectures relating to the general subject of the Forum: "The Art of Ceramics".

A set of lectures embraced ceramic processing:

- Prof. Roman Pampuch, Academy of Mining and Metallurgy, Cracow, Poland: "Art and Handicraft: Two Faces of Ceramics"
- Prof. Dale E. Niesz, Rutgers University, USA: "Ceramic Manufacturing: a Blend of Art and Science"
- Prof. Egon Matijevic, Clarkson University, USA: "Monodispersed Fine Particles in Ceramics Technology: Science and Art"

A second set included presentations mostly oriented to ceramic art and anthropology:

- Prof. W.D. Kingery, University of Arizona, USA: "Ceramics in Art"
- Dr. Toshiro Fujiwara, INAX Corporation, Japan: "History and Art of Japanese Ceramics"
- Prof. Richard H.J. Hannink, CSIRO, Victoria, Australia: "Australian Aborigines, Art and Ceramics"
- Prof. Cesare Fiori, University of Ravenna, Italy: "Colours and Stories of Italian Mosaic"

The final group of lectures was mainly directed to structure and microstructure, also including the relatively new exciting area of templated structures:

- Prof. Robert E. Newnham, The Penn State University, USA: "Symmetry of Electroceramics"
- Prof. Frank Mücklich, Universität de Saarlandes, Germany: "Beauty, Mystery and Regularity of Microstructures"
- Prof. Arthur H. Heuer, Case Western Reserve University, USA: "Biological Ceramics or All You Wanted to Know about Shells"
- Prof. Gary L. Messing, The Penn State University, USA: "Templated Grain Growth: the Art and Science of Patterning Ceramic Microstructures"

The scientific sessions were accompanied by a social programme including (besides the tour to Ravello which gave the opportunity of sightseeing some of the most beautiful places along the Amalfi Coast such as Amalfi itself, Positano, etc.) a guided visit to Pompei and a boat tour to the island of Capri. Academy Members and their guests also attended the Official Dinner of the Forum which took place in a renowned typical restaurant of the Sorrento Coast "Antico Francischello" just in front of the island of Capri and had the opportunity to taste fish dishes of the tradition accompanied by delightful wines.

The welcome to participants on behalf of the Academy was extended by Council Chairman Pietro Vincenzini who also briefly summarized previous Academy activities.

duction. This process enables the production of large light guide preform overcladding tubes, whose availability in appropriate size, purity and especially price, is critical in the tight light guide fiber market of today. For adequate mechanical

Vladimir Ja. Shevchenko presents greetings on behalf of the Advisory Committee "Industry and Innovation". Greetings were also presented by Nils Claussen in his vest of Chairman of the Advisory Committee for "Science". He also briefly outlined the guidelines of the general scientific contents of the Forum.

strength, the outer surface of such tubes must contain an extremely small number of "impurities" which can lead to spatial defects or "flaws" greater than one micron in size. The number of such defects must be less than one

Noburo Ichinose illustrates the selection procedures for the recipients of the "3rd International Ceramics Prize" of the Academy.

per 1000 kilometers of fiber length! Accomplishing this in an essentially "ceramic" process is quite extraordinary.





Inauguration of the FORUM 2000 in Ravello. The ceremony was hosted in the auditorium of "Villa Rufolo" whose cross vaulting architecture dates back to the XIII Century. FORUM 2000 was attended by most of the "active" Members of the Academy, coming from all over the world.

WELCOME ADDRESS

Pietro Vincenzini
Chairman of Council
Academy of Ceramics

Mr. President, Mr. Mayor of Ravello, Dear Colleagues, Honorable Guests

It is a privilege and an honour, on behalf of the Academy Council, to extend to all of you a most cordial welcome to the 3rd Forum of the Academy of Ceramics.

Let me express to Mayor Secondo Amalfitano a warm appreciation for his kindness in hosting the inaugural session of the Forum in Ravello, a very special town that as from several centuries is attracting leading personalities and a large number of estimators of its very peculiar cultural and historical environment which combines with a landscape of incomparable beauty.

Located just in the middle of the "Costiera Amalfitana", so called from the name of the city of Amalfi, one of the four ancient Italian Maritime Republics, Ravello also is surrounded by a number of places boasting millenary traditions in the production of ceramics - Vietri, Amalfi itself and a number of others - an activity which is flourishing also today: based on handicraft and excellent industrial productions. This has been a further reason in selecting Ravello as the seat for

the opening of the Forum.

Main objective of the Academy is of promoting progress in the field of ceramics by fostering a better understanding of the close and complex interactions of ceramic technology, economic structure, social organizations and cultural beliefs. This wide-embracing scope has been the object of previous editions of the Forum which were held in Assisi in 1992 "CERAMICS AND SOCIETY" and in Cracow in 1996 "ROLE OF CERAMICS IN A SELF-SUSTAINING ENVIRONMENT".

In Assisi, the social context within which developments in ceramics must be made was discussed, as well as the wide ranging features of ceramic materials themselves which would require attention and advance if their full technological promise was to be realized. In Cracow, the special role ceramic materials and technologies based on their use may play was explored, that would contribute to the move of the modern societies towards developmental models with which more importance is attached to the quality of life and to a more intelligent use of natural resources.

An introspection within the ceramic field is being proposed as the theme for this 3rd Forum "The Art of Ceramics", aimed at disclosing common features and interrelating aspects of ceramics history and art, applied

science and materials processing. Prof. Nils Claussen, Chairman of the Scientific Committee for the Forum, will briefly highlight the very special approach pursued to challenge this very stimulating subject.

Another main scope of the Academy is of rewarding and honoring those individuals who have made significant contribution to the advancement of ceramics. The International Ceramics Prize is one of the means to fulfil this objective. Significant advances in both traditional and newer classes of ceramics have yet been recognized by previous Academy Prizes. May I recall the noteworthy advancements in the design and use of "smart" ceramics recognized to Robert Newnham, the development of high temperature high strength engine turbocharger rotors recognized to Isao Oda and Minoru Matsui, the introduction of honeycomb cordierite ceramics used for the catalytic reduction of automotive exhaust emissions recognized to Ronald M. Lewis, Irwin M. Lachman and Rodney D. Bagley, and, in the field of traditional ceramics, the outstanding innovation introduced by the Italian company "Marazzi" concerning the fast and single firing of ceramic wall & floor tiles, a technology which has spreaded all over the world, and the development of innovative refractory products performed by the "Compagnie of Saint Gobain", France, espe-



cially under the action of Joseph Recasens. The prizes which will be awarded today will recognize outstanding achievements in thermosstructural composites and in optical fiber processing, fields which are critical for the industrial feasibility of a number of advanced technologies. Prof. Noburo Ichinose, Chairman of the Prize Committee will briefly comment on the purposes of the Prize and present the Prize Laureates.

Now, I would like to extend grateful appreciation to all Academy Members and their guests present here for granting the Academy with their active involvement. Special thanks to Prof. Nils Claussen and Prof. Noburo Ichinose and to all Members of the Forum and Prize Committees, to Invited Lecturers and to all those Academicians who are actively contributing in the Academy Boards and Committees.

And, last but not least, I would like to welcome the Council Members participating in this Forum: Dr. Lorian Bocini, Dr. Roberto Bossetti and Dr. Ing. Mauro Poppi who represent high renowned companies concretely supporting Academy activities. Finally, let me wish to all of you an enjoyable time and, for this Forum, to further contribute to the general scopes of our professional activities.

Academy Council Chairman Pietro Vincenzi accepting the "Greetings" certificate handed over by Edwin Ruh on behalf of the American Ceramic Society.



Roger Naslain was the recipient of the "3rd International Ceramics Prize" for "Basic Research". Recognized has been his distinguished and creative contribution to fundamental research on ceramic fibers and high temperature ceramic composites. The Prize Diploma was presented to Naslain by Council Member Dr. Roberto Bossetti (Siti Spa, Italy).



Council Member Dr. Lorian Bocini (Industrie Bitossi, Italy) congratulates with Dr. MacChesney (Lucent Technologies, USA) who was the recipient together with David W. Johnson Jr. of the Prize for "Industrial Research". The Prize has been awarded for the outstanding results obtained in the development of large sol-gel derived bodies suitable to the production of practically defect-free large lightguide preform overcladding tubes.

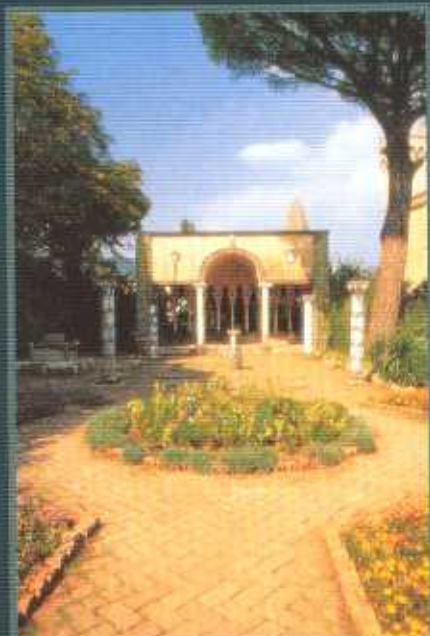


The Prize Diploma to the co-winner of the Prize for "Industrial Research" David W. Johnson, Jr. (Lucent Technologies, USA) has been handed out by Council Member Dr. Ing. Mauro Poppi (IPEG Spa, Italy).





"Villa Cimbrone": Terrazza dell'Infinito (Terrace of the Infinite).



"Villa Cimbrone": The Tea Room.

"INTERNATIONAL CERAMICS PRIZE 2000" BASIC RESEARCH

Winner: Roger A. Naslain
University of Bordeaux, France

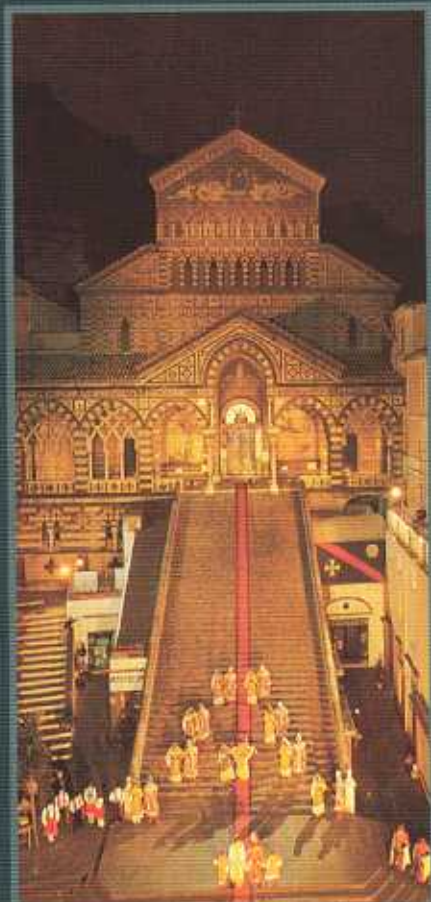
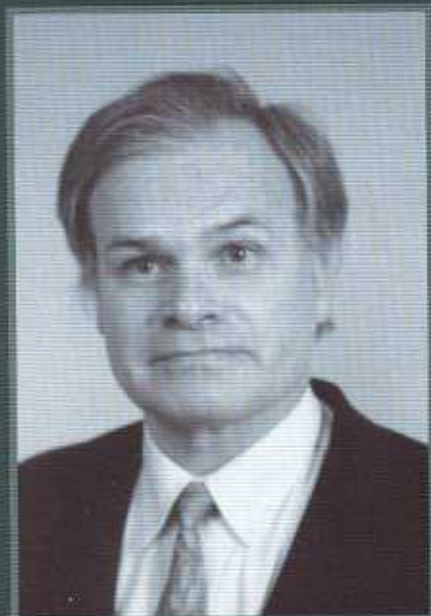
Motivation:

"For distinguished and creative contribution to

basic research on ceramic fibers and ceramic matrix composites"

Roger Naslain is a professor of materials science at the University of Bordeaux. He received his Ph.D. in 1967 at the University of Bordeaux in Solid State Chemistry. He spent one year, in 1968, at the Research and Development Center of General Electric Co., in Schenectady, as a postdoc researcher. From 1969 to 1983, he was the leader of a research group on metal matrix composites at the CNRS-Solid State Chemistry Laboratory, Bordeaux. From 1983 to 1987, he was in charge of the Institute for Composite Materials, a technology transfer institution in Bordeaux. Since 1988, he is the director of the Laboratory for Thermostructural Composites, a university-industry laboratory involving CNRS, the University of Bordeaux and a company from the aerospace field, SEP.

Naslain has written approximately 150 articles and holds twelve patents. He has been the editor of two books. His work has covered the crystal chemistry of boron and boron-rich borides and, more recently, the processing and characterization of metal or ceramic matrix composites (including chemical vapor infiltration techniques).



The Amalfi Cathedral.

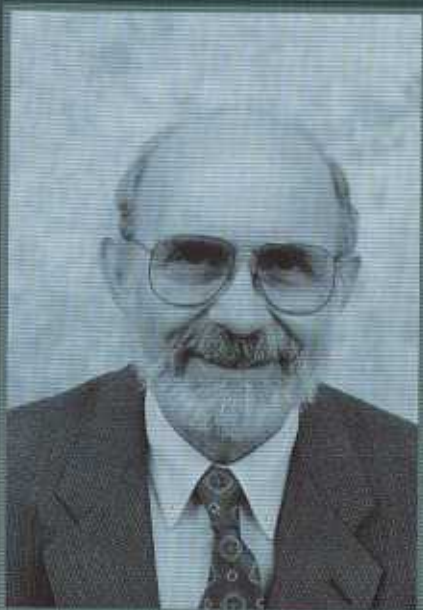


"INTERNATIONAL CERAMICS PRIZE 2000" INDUSTRIAL RESEARCH

Winners: David W. Johnson, Jr. and John MacChesney
Lucent Technologies, AT&T Bell Laboratories,
N.J., USA

Motivation:

"For outstanding achievements in translating sol-gel science into a real technology, and specifically the development of large size sol derived glass bodies tailored to optical fiber production"



David W. Johnson, Jr. is Head Metallurgy and Ceramics Research Department, AT&T Bell Laboratories (Lucent Technology), and Professor of Materials Science at the Stevens Institute of Technology, Hoboken, New Jersey. He gained his B.S. and PhD in Ceramic Science both at The Pennsylvania State University, in 1964 and 1968 respectively. His research activities have been mainly directed to:

fabrication and processing of spinel ferrites, synthesis and fabrication of high T_c oxide superconductors emphasizing the processing of ceramic shapes of potential technological interest, sol-gel processing of glass and ceramics emphasizing colloidal sols of fumed silica used to fabricate large pieces of transparent high silica glass. Other interests included negative thermal expansion ceramics, thin film

dielectrics prepared by sputtering and CVD; preparation of sodium ion conductor materials, preparation of oxide catalysts and characterization of ceramic powders.

Author of over 130 publications on ceramics processing and related research, he also holds 33 patents. He is a member of a number of Professional societies including National Academy of Engineering, Fellow of American Ceramic Society (Electronics Division Chair, 1984-85), Publications Committee Chair 1988-1991, Vice President 1990-1992, Treasurer 1992-1993, President-Elect (1993-94), President (1994-95), Parliamentarian, 1997-present, Materials Research Society, North American Thermal Analysis Society, AAAS, TMS, ASM International, ASTM - Subcommittee C21.07; S-21 Chairman 1979-82. His honours and awards include:

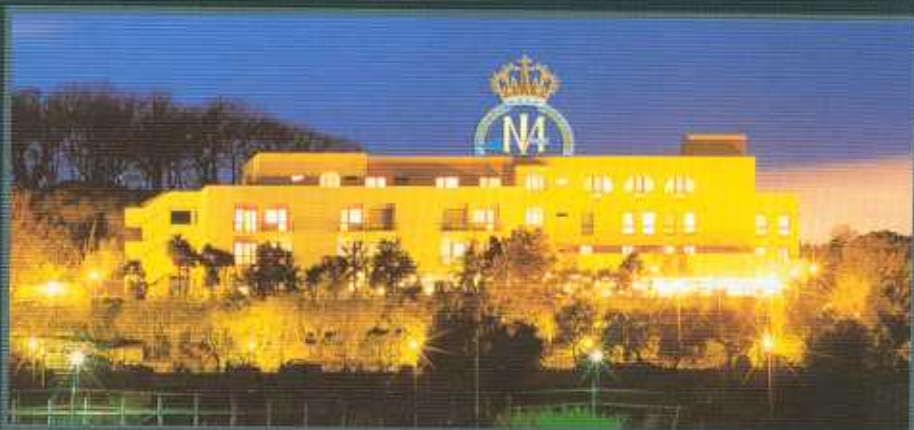
John Jeppson Award, American Ceramic Society, 1998; Taylor Lecture Award, Penn State University, 1987; Fulrath Award from American Ceramic Society, 1984; Ross Cuffin Purdy Award, best paper in ceramic literature, 1978.

John MacChesney joined AT&T Bell Laboratories in 1959 shortly after receiving his Ph.D. in geochemistry from the Pennsylvania State University. Early in his career he worked on crystalline materials exhibiting novel electronic, magnetic, and optical properties. MacChesney's attention moved to glass in the 1970s, focusing on producing fused silica with the purity and configuration needed for optical fibers. His work in this area led to the invention of the modified chemical deposition process (MCVD). After developing MCVD, MacChesney, with

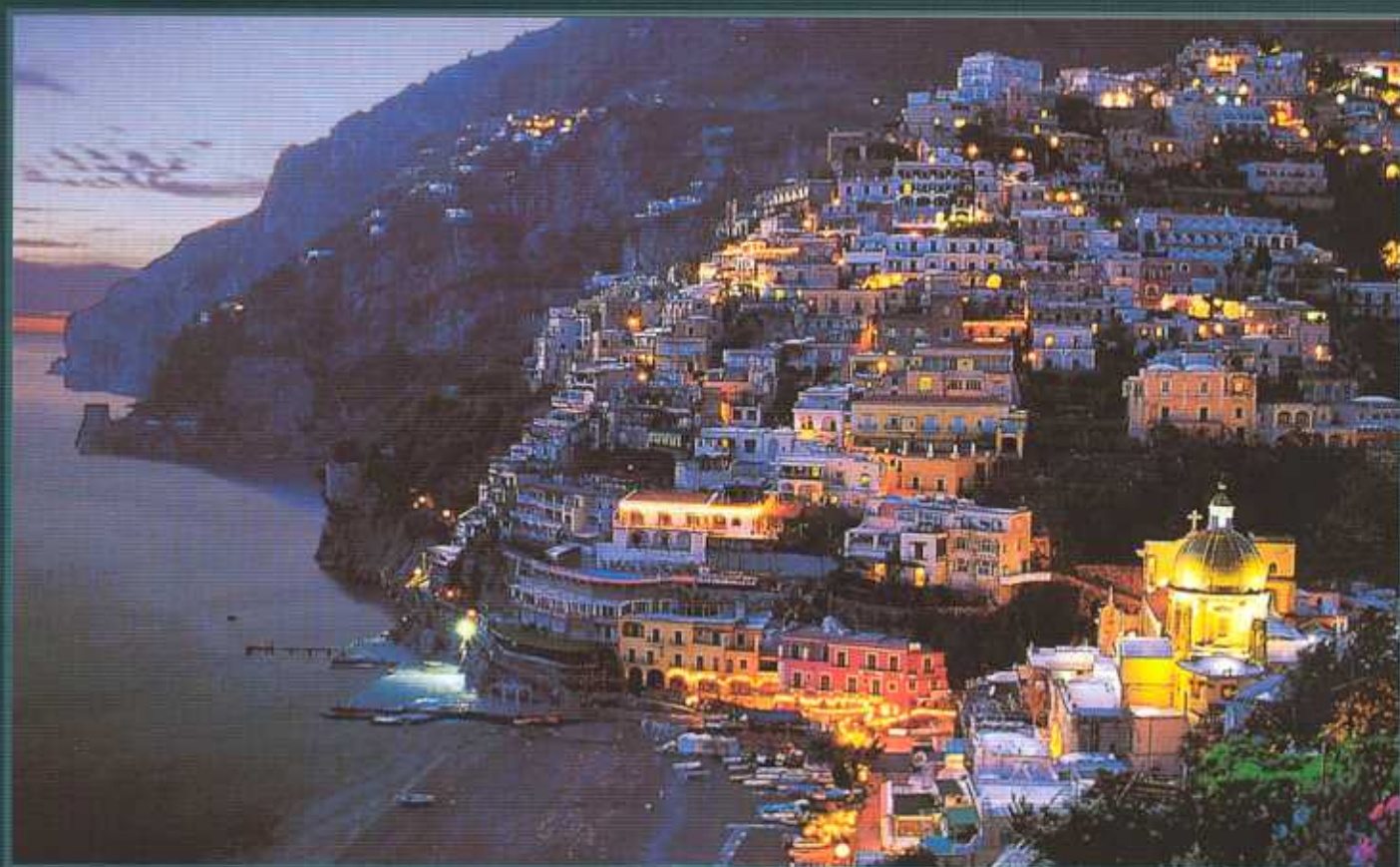


D.W. Johnson, Jr. devised a sol-gel process for making large silica bodies – a way in which interparticle forces are controlled to produce large-shaped bodies that can be sintered to waveguide quality glass. For this invention he was recognized in 1999 by the National Academy of Engineering, including a money prize of 350,000 US\$.

A member of the National Academy of Engineering and IEEE/LEOS, MacChesney is a Fellow of both the American Ceramic Society and AT&T Bell Laboratories. He has been honored for his work by organizations such as the Japan Fine Ceramics Association, AT&T, the American Society of Metals, and the American Physical Society, Optical Society of America, Institute of Electrical and Electronic Engineers, and The American Ceramic Society.



The Grand Hotel "Nastro Azzurro" (Meta di Sorrento), the seat for the scientific sessions of FORUM 2000.



Many picturesque places were crossed during the coach transfer from Sorrento to Ravello. Among these Positano and Amalfi, two of the most famous "pearls" of the Amalfi Coast.

ACADEMY OF CERAMICS PRIZE WINNERS

International Ceramics Prize 1992 Class: Basic Research

Winner: Robert E. Newnham
Pennsylvania State University, USA

Motivation:

"For distinguished, creative and exceptional interdisciplinary contributions to the advancement of ceramics science and culture, especially in composite electroceramics including intelligent ceramics"



International Ceramics Prize 1996 Class: Industry and Innovation "Classical Ceramics"

Winner: Filippo Marazzi
Marazzi Group, Italy

Motivation:

"For outstanding technological achievements in the field of traditional ceramics, and specifically for the successful introduction of rapid firing of glazed floor tiles in mono-layer roller kilns"



International Ceramics Prize 1996 Class: Industry and Innovation "Classical Ceramics"

Winner: Joseph Recasens
Saint Gobain, France

Motivation:

"For distinguished and creative contributions to the developments of new technologies and products in the refractory ceramics industry"





International Ceramics Prize 1996
Class: Industry and Innovation
"Advanced Ceramics"

Winners: Rodney D. Bagley,
 Irwin M. Lachman and
 Ronald M. Lewis
 Corning Inc., USA

Motivation:

"For remarkable achievements in the technology of advanced ceramics, and specifically for the invention of the cordierite honeycomb substrates for automotive emission control"



International Ceramics Prize 1996
Class: Industry and Innovation
"Advanced Ceramics"

Winners: Isao Oda and
 Minoru Matsui
 NKG Insulators, Japan

Motivation:

"For outstanding achievements in the technology of advanced ceramics, and specifically for the development of the silicon nitride turbocharger rotors successfully introduced in the automobile market"



A group of delegates at FORUM 2000 during the visit to the gardens of "Villa Rufolo". In this place Richard Wagner found his magical garden of Klügsor that inspired the 2nd act of Parsifal (May, 1880). "Villa Rufolo" also is the seat of the European University for the Cultural Heritage.