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## Third Pacific Polymer Conference. Gold Coast - Australia

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## Conference Report

# Third Pacific Polymer Conference Gold Coast – Australia



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Graeme George



Otto Vogl

The 3rd Pacific Polymer Conference was held at the Conrad International Hotel at the Gold Coast of Australia from December 13 to 17, 1993. It attracted about 450 participants from 19 countries. It consisted of 47 invited lectures and 390 papers, 240 in the form of oral presentations and about 150 in poster form. The meeting was organized by the Polymer Division of the Royal Australian Chemical Institute. The chairman of the meeting was James H. O'Donnell, with Donald H. Napper and David H. Solomon as the Vice-chairmen; Peter J. Pomery was the Secretary and David J. T. Hill the Treasurer. The Pacific Polymer Preprints had an impressive 900 pages.

The 3rd Pacific Conference has as its highlight two Plenary Fora: "The Future of Polymer Science and Technology in the Pacific Region" and "Polymer Materials and the Environment." Many important subjects were covered during the conference: Polymer Synthesis, Polymer Characterization, Polymer Crystallization, Polymer Kinetics, Polymer Surfaces, Polymer Degradation, Polymer Networks, Polymer Diffusion, Polymer Engineering, Polymer Membranes, Polymer Blends, Polymer Composites, Structure/Property Relationships, Biopolymers, Conducting Polymers, Liquid Crystalline Polymers, Modelling, Optoelectronics, Elastomers and Polyesters. Of more general interest was the attention that was paid to Polymer Education. As in the last two conferences, one day was set aside for a symposium on "Polymer Science and the Arts."

The invited lectures reflected the diversity of the topics covered. J. E. McGrath, Virginia Polytechnic Institute and State University, Blacksburg, VA discussed the "Synthesis of High Performance Polymeric Matrix and Adhesive Materials Systems." Fluorine and phosphine oxide containing high performance thermoplastic and thermosetting polyimides have been prepared; they are either totally amorphous or semicrystalline.

M. Kuramoto, Idemitsu Petrochemical Co. Ltd., Ichihara, Chiba, Japan described "Stereospecific Polymerization of

Styrene." Polystyrene of high syndiotacticity (m.p. 270 °C) has been synthesized with titanium compounds – methylmetallocene initiating systems. A number of titanium compounds are active but have various activities and give syndiotactic polystyrenes that crystallize rapidly and are of relatively narrow MW distribution. All three types of polystyrenes can now be synthesized, isotactic polystyrene with typical Ziegler Natta type and atactic polystyrene with radical initiators.

Y. Okamoto, Nagoya University, Nagoya, Japan outlined the "Helix-Sense-Selective Polymerization of Methacrylates and Conformational Characteristics of the Polymers." Helix-sense selective polymerization of bulky triarylmethyl methacrylates has been accomplished with chiral anionic initiators. Optically active polymers with one-handed helical structures have been obtained and some of the polymers exhibited characteristic conformational transitions in solution.

Y. Imanishi, Kyoto University, Kyoto, Japan, presented the "Construction of Polypeptide Tertiary Structure by the Template-Assisted Synthesis." Design of artificial proteins uses template molecules by which the spatial arrangement of the peptide fragments with the secondary structure is regulated to construct the super-secondary or tertiary structure. Cyclic peptides were used as the template molecules. Two basic alpha-helical peptides were designed to associate together to mimic a class of transcriptional regular proteins which bind to DNA.

K. B. Wagener, University of Florida, Gainesville, FL contributed to the very popular session on synthesis with his lecture on "Structure Reactivity Relationship in Acyclic Diene Metathesis Polymerization." High molecular weight polymers have been synthesized via acyclic diene metathesis reaction of





nonconjugated dienes. This polymerization reaction gave unsaturated polymers with ethylene as the side product. The rules were established which showed under which conditions the polymerization occurred and when not. It depended on the position of the substitution of the structure of the diene.

Among the several invited lectures on conducting polymers was that from H.S.O. Chan, National University of Singapore, Kent Ridge, Singapore, on "Disubstituted Poly(bithiophene)s: Synthesis and Applications." Poly(bithiophene) film coated on indium tin-oxide glass plate was used to detect low levels of ascorbic acid based on changes in the UV-visible absorption characteristic of the doped polymer.

Y. Chujo, Kyoto University, Kyoto, Japan contributed to the synthesis symposium with his paper on "Hydroboration Polymerization." Hydroboration is a well-known tool in organic synthesis, which takes place under mild conditions to produce various alkylborane compounds quantitatively. The polymerization reaction of the hydroboration between diene and hexylborane, the formation of poly(cyclodiborazane)s and the haloboration polymerization to form the first polymeric superacids were discussed.

J. C. Jung, Pohang Institute of Science and Technology, Pohang, Kyungbuk, Korea, discussed "Rigid Rod Polyimides with n-Alkoxyethyl Side Branches." Rigid-rod polyimides with regularly substituted flexible side chains are known to have excellent thermal stability. New pyromellitic, benzophenone-tetracarboxylic and naphthalene-tetracarboxylic polyimides with n-alkoxyethyl side chains were synthesized and studied.



James H. O'Donnell



David J. T. Hill

S. Tantayanon, Chulalongkorn University, Bangkok, Thailand presented her work on the "Synthesis of Poly(p-epoxystyrene-co-N-phenylmaleimide-co-styrene)." Polymers containing the epoxide group are one of the interesting negative electron-beam resists which play an important role in microlithography. Since thermal stability of the resist was desired in the processability of microelectronic manufacture the glass transition temperature of the poly(p-epoxystyrene-co-styrene) was increased by incorporating N-phenylmaleimide into the polymer.

V. L. Dang, National Center for Natural Science and Technology, Hanoi, Vietnam described the "Production, Modifications and Applications of Chitosan in Vietnam." Of the important natural polymers, chitin is second only to cellulose in natural abundance. Chitin is isolated from crustacean shells and chitosan is prepared from the chitin by N-deacetylation with alkali. An efficient process was described for the production of various derivatives of chitin and chitosan and some applications of chitosan. Chitosan is biocompatible, biodegradable, inactive as an antigen, active as an immunoadjuvant and non-toxic even by intravenous administration.

R. G. Gilbert, Sydney University, Sydney, NSW, Australia led a forum on polymerization kinetics and lectured on the "Measurement and Meaning of Rate Coefficients Controlling Molecular Weights in Free-Radical Polymerizations." Molecular weight distribution in a free-radical polymerization is controlled by the rate coefficients for radical creation from initiator, propagation and chain-stopping events. Termination may be by recombination, disproportionation and chain transfer. Predictions of the molecular weight distribution can be carried out from knowledge of these rate coefficients.



Gold Coast

## Conference Report



**Jupiters Casino and Conrad International, Gold Coast, Queensland**

I. D. Jenkins, Griffith University, Nathan, QLD, Australia outlined "Some Recent Developments in the Aminoxy Radical Trapping Technique." Free radical polymerization involves the reaction between an initiating radical and a monomer to produce a carbon-centered radical, which then adds to a second monomer to produce a new carbon-centered radical. It has now been possible to identify the structures of the first formed carbon-centered radical. These studies have revealed a rich variety of first generation radicals, which rely on the diffusion controlled trapping of carbon-centered radicals by stable aminoxy radicals to form stable alkoxyamine products.

J. Economy, University of Illinois, Urbana, IL, gave a presentation on "ITR, a New Concept in Polymer Processing." Interchain transesterification reactions were studied as a tool for facilitating processing of high performance polyesters. Liquid crystalline copolymers based on p-hydroxybenzoic acid and 2,6-hydroxynaphthoic acid formed polymers which are capable of forming good high temperature adhesive bonds to metal substrates.

A. L. Logathetis, Du Pont Co., Wilmington, DE, outlined the "Developments in Perfluoroelastomers: Chemistry, Properties and Applications." Perfluoroelastomers are specialty products representing less than 1% of the total fluoroelastomer market, which is dominated by vinylidene fluoride based copolymers. These perfluoroelastomers are copolymers of tetrafluoroethylene and perfluoroalkyl vinyl ethers (20–40%) and completely amorphous. A third monomer (0.5–1%) is added to make these polymers crosslinkable. Two techniques are used: C-H Bond as Crosslinking Functionality and Crosslinking by High Energy Radiation.

I. Abdullah, University Kebangsaan Malaysia, Bangi, Malaysia, discussed "Liquid Rubber: Preparation and Application." Liquid rubbers are a class of elastomers or elastomer precursors that can be pumped or poured at room temperature or slightly above. Commercially available liquid natural rubber can be prepared by extensive mastication in air which is a mechanochemical oxidation of the radicals generated during mastication. Liquid natural rubber can be easily modified by chlorination by maleic anhydride addition for paints and adhesives.

K. J. Wynne, Office of Naval Research, Arlington, VA, organized a special session on functional polymer surfaces of



**Yoshikazu Ito**



**Peter J. Pomery**

biological significance and contributed a key note lecture on "Polymer Design for Minimally Adhesive Surfaces." Research was aimed at the creation of surfaces to which marine organisms adhere with great difficulty. Segmented polyurethanes were prepared with soft segments designed to produce minimal adhesion based on polydimethylsiloxane-urea-urethane copolymers.

"Spectroscopic Studies of Conducting Polymers on Oxide Catalysts" was the subject of a lecture by R. P. Cooney, University of Auckland, Auckland, New Zealand. Organic polymers are renowned for their excellent electrical insulating properties. Conducting polymers, such as polypyrrole or polythiophene, when deposited by electrochemical deposition, have a relatively disordered crosslinked structure. One solution to this problem is to synthesize conducting polymers within the confines of a zeolite channel, which was facilitated by the presence of cations such as copper with a high oxidizing power.

J. W. White, The Australian National University, Canberra, ACT, Australia, described "Structure of Polymeric Surfactants at the Air-Water Interface by Specular and Off-Specular Neutron Reflectivity." Specular reflection of radiation from the air-film-water interface leads to information about the film thickness and densities in the direction normal to the surface. The presence of a pattern of scattering length density in the plane of the interface can produce off-specular reflections, which is creating interest both in the case of x-rays and neutrons.



**Van Luyen  
Dang**

**Stella  
O'Donnell**





**Supanan  
Tantayanon**

**Akihiro  
Abe**

**Renyuan  
Qian**

M. A. Winnik, University of Toronto, Toronto, ONT, Canada, presented his work on "Fluorescence Studies of Polymer Diffusion Across Interfaces." Latex films were formed when a dispersion of latex microspheres in water was allowed to dry at room temperature above the glass transition temperature of the polymer. When microspheres contain polar substituents at their surface, these substituents can get trapped between adjacent particles in the film. The polar groups can serve as a barrier to polymer interdiffusion in the film, or if the membrane components can act as plasticizers for the matrix polymer, it can serve to enhance the diffusion process.

P. Pincus, University of California, Santa Barbara, CA, lectured on "The Interactions Between Polymers and Membranes." The behavior of amphiphilic molecules in solvents may act as surfactants to self-assemble into sheetlike surfactant bilayers which have been studied as model systems for biological membranes, for chemical delivery, surface protective coatings or sensors.

S. Amiya, Kuraray Co. Ltd., Kurashiki, Japan discussed "Recent Advances in the NMR Characterization of Polymers." Poly(vinyl alcohol) and poly(vinyl acetate) have been studied by NMR spectroscopy especially two-dimensional spectroscopy for their tacticity, sequence distribution, end-groups, short chain-branching, 1,2 glycol linkages (head to head placements of the monomer) and polyene structure representing the loss of water from the polymer structure.

K. Horie, University of Tokyo, Hongo, Tokyo, Japan, presented his work on "Charge-Transfer Fluorescence and Photochemistry of Aromatic Polymers." Polyimides have become very important insulation materials in the microelectronic field. Intermolecular charge-transfer fluorescence of aromatic polyimides is sensitive to molecular aggregation and is also useful for monitoring thermal imidization and evaluation for the miscibility of polyimide blends. The charge-transfer fluorescence of aromatic polyimides and liquid crystalline polyester as well as the improvement of photoreactivity of photosensitive polyimides were examined.

The paper by Jong-Kee Yeo, Lucky Ltd. R & D Research Center, Taejeon, Korea, "Sol-Gel Processed SOG Materials and Their Properties," was presented by his colleague Dr. Park. The fabrication of semiconductor chips with ultra large scale integration has been heading toward higher integration and



**Ezio  
Rizzardo**

**Motowo  
Takayanagi**

smaller size, which inevitably requires multiple metallization layers and interlevel planarization with dielectric materials. The spin-on glass films technique is widely used. Hydrolysis and condensation reactions of silane monomers were used for the deposition technique. Basic film properties were examined after curing the SOG coated films.

G. L. Wilkes, Virginia Polytechnic Institute and State University, Blacksburg, VA, presented an elegant study of the "Synthesis/Structure and Property Behavior of Inorganic Organic Network Materials." Appropriately functionalized organic species (polymers, oligomers and low molecular species) in conjunction with additional metal alkoxides through the use of the well known "sol gel scheme" were used for making high purity ceramics from alkoxide species as well as interesting network materials.

H. Bu, Fudan University, Shanghai, China, gave his view of the "Single Chain Single Crystal." Separation and observation of amorphous single-chain polymers have been achieved for a few non-crystalline polymers. A new method has now been developed that makes use of monomolecular patches on a liquid surface for the crystallization of single chain single crystals of poly(ethylene oxide) and isotactic polystyrene.

G. Shi, Shanghai Institute of Organic Chemistry, Shanghai, China, lectured on "Recent Studies on beta-Crystalline Form of Isotactic Polypropylene." Isotactic polypropylene shows four distinguishable chain conformations each being a 3/1 helix. Different packing geometries lead to three well known crystalline structures (polymorphs) namely the monoclinic alpha-form, the hexagonal beta-form and the triclinic gamma-form. The appearance of these structures is critically dependent upon the crystallization conditions. Among the three crystalline structures, the monoclinic alpha-form is by far the most common. It is the normal melt-crystallized and solution crystallized form. The beta-form and the gamma form were considered laboratory curiosities. Only few nucleating agents induce the production of beta-polypropylene. It has been found



Takeshi Takehiko

that dibasic acids, such as pimelic or azelaic acid salts of the group II elements, calcium, magnesium or barium, added as oxide or hydroxide acted as excellent nucleating agents for beta-propylene crystallization.

S. Kitayama, Sumitomo Chemical Co. Ltd., Tsukuba, Ibaraki, Japan, described "A Novel Polymer Film That Controls Light Transmission." This novel light control film changes appearance from translucent to opaque, depending on the angle with which it is viewed. This phenomena is caused by the microstructure that is formed during photopolymerization. The composition of the light controlled films is composed of at least two photopolymerizable monomers of oligomers having different refractive indices and reactivities.

The theme of intelligent polymers was addressed by G. G. Wallace, University of Wollongong, Wollongong, NSW, Australia, in his talk on "Performance on Demand - A New Era in Polymer Science." Numerous emerging technologies involving the use of polymers place ever increasing demands on the capabilities of materials. In the development of new sensors the active polymer must be able to recognize certain ions or molecules, interact with them and then release them. These application areas rely on the ability to call particular properties of the polymer system into play when they are required. They must perform on command each time! Several application areas for conducting polymers were discussed: Conducting Electroactive Polymers; Controlled Release Technologies; Separation Technologies; New Biosensing Technologies.

A. Natansohn, Queen's University, Kingston, ONT, Canada, Canada's Councillor to the PPF, discussed "Reversible Optical Storage in Azo Polymers." Amorphous polymers containing aromatic azobenzene groups bound within the polymer structure can be used for reversible optical storage. The process is based on photochemical Trans-cis-trans isomerization cycles and the "written" state is an induced supramolecular order, while the initial state as well as the "erased" state are amorphous and disordered. This supramolecular organization is obtained by

selective polarization of the laser light for "writing."

In considering the problem of fabrication of conducting polymers, S. Miyata, Tokyo University of Agriculture and Technology, Koganei, Tokyo, Japan, described the preparation of "Highly Electrical Conducting Polymer Alloys." This involved casting films of poly(vinyl acetate) and pyrrole with ferric oxide as oxidant. The polymerization of pyrrole occurred as the oxidation potential increased on solvent evaporation.

C. Y. Kim, Polymer Materials Laboratory, KIST, Seoul, Korea, described "In Situ Spectroscopy of Redox Reaction in Polypyrrole." Polypyrrole formed by electrochemical polymerization is regarded as a stable material but undergoes significant changes under application conditions. Visible spectroscopy and FT-Raman has been used to study these changes and the cause of degradation.

S. C. Kim, Department of Chemical Engineering, KAIST, Taejeon, Korea presented his work on the "Application of Interpenetrating Network Materials." Hydrophilic-hydrophobic IPN membranes obtained by sequential polymerization to form poly(styrene-co-acrylonitrile) and polyacrylic acid were shown to have enhanced separation of ethanol and water from 20% aqueous ethanol solutions. Hydrophilic-hydrophobic IPN's based on polyurethane chemistry were also prepared and showed good blood compatibility.

T. Ogawa, Universidad Nacional Autonoma de Mexico, Coyoacan, Mexico, discussed the "Synthesis and Characterization of Some New Polydiacetylenes." A few new polyamide based diacetylenes were synthesized, cast and polymerized by topochemical cross-polymerization on irradiation or heating to give deep bluish transparent films. Small modifications in the chemical structure changed the polymerizability.

M. Jaffe, Hoechst Celanese Research Division, Summit, NJ, provided "New Insights in the Structure-Property Relationships of Thermotropic Polyesters." Thermotropic copolymers of p-hydroxybenzoic acid, isophthalic acid and hydroquinone have been investigated as a model for process-structure-property relationships of nematogenic copolymers. Both thermal and mechanical properties are sensitive to the ordering of the 'mers' in the molecular backbone.

S. Fujishige, Tokyo Kasei University, Itabashi, Tokyo, Japan, presented "A New Family of Water-Soluble Polymers of N-Substituted Acrylamide Derivatives." A series of water soluble polymers were synthesized from N-substituted acrylamides and methacrylamides and their solubility properties studied, together with that of the N-propyl derivatives by viscometry, light scattering, NMR and DSC.

W. H. Daly, Louisiana State University, Baton Rouge, LA, showed the advantages of "Enhancing Reinforcing Effects of Polymers in Asphalt: an Applied Approach to Solid Waste Disposal." Blends of polymeric materials with asphalt are complex and characteristically unique paving materials. The physical properties of asphalt polymer blends are affected by the amount of polymeric material added, its composition, its molecular weight, but most important, is the compatibility of the asphalt-cement with the admixed polymer.

H. B. Lee, Korean Research Institute of Chemical Technology, Taejeon, Korea, discussed his work on "Cell Adhesion and Protein Adsorption on Gradient Surfaces." Detailed analysis of surface-induced changes of adhered cells or



adsorbed proteins requires a series of well characterized surfaces, each having a constant chemical and physical property. Chinese hamster ovary cells as a model system and human albumin as a model protein were studied. Wettability gradients occur because hydrophobic interaction of the protein molecules with the hydrophobic section of the gradient surface seems to be important.

P. J. Carreau, CRASP Ecole Polytechnique de Montreal, Quebec, QUE, Canada, described the "Rheological Properties of Blends: Facts and Challenges." Three forces will continue to provide incentive for the industry to produce new polymer blends: the ability to tailor product properties to a particular performance cost balance; fast entry into new markets; and it is easier to develop products for small or niche markets than by synthesizing new polymers. The rheological behavior of blends is complex and depends in a complex manner on the properties and components of the constituents.

T. Nose, Tokyo Institute of Technology, Ookayama, Tokyo, Japan, outlined the "Kinetics of Phase Separation of Polymer Blends." The coexistence curve is an indispensable information for studying phase separation kinetics. It describes the stability and the fractional phase-volume of the systems. Experimental difficulties have now been overcome and it is now possible to determine precisely the coexistence curves of polymer blends.

W. H. Jo, Seoul National University, Seoul, Korea, presented "Morphology Control in Immiscible Polymer Blends." Many miscible polymer blends have been developed, still there is a substantial amount of interest in the structure and properties of immiscible polymers blends. Coarse phase dispersion and coalescence together with poor adhesion between phases are the limiting factors in all applications. Many immiscible polymer pairs have been compatibilized by the addition of a third component such as graft or block copolymers. Several examples have been studied.

D. J. Carlsson, National Research Council of Canada, Ottawa, ONT, Canada, led the symposium on polymer degradation with a paper on "Degradation of gamma-Irradiated Polyolefins: Oxidation and Stabilization." The gamma-ray irradiation of solid polyolefins leads to random bond scission and the generation of radicals. A combination of infrared, derivatization infrared and electron spin spectroscopies and physical testing has been used to explore the reaction intermediates in the presence and absence of novel stabilizer mixtures. This has led to a comprehensive view of the gamma-ray initiated degradation process and the mechanisms by which new highly effective stabilizers may function.

M. R. Binns, BHP Steel, Research and Technology Center, Port Kembla, NSW, Australia, described "New Techniques for the Early Detection of Polymer Degradation." Most degradation studies use the accelerated testing of materials. A newer approach of apparently good reliability of "Sensitive Monitoring of Natural Degradation," tries to isolate the individual degradative processes that occur in a natural environment.

D. J. Liaw, National Taiwan Institute of Technology, Taipei, Taiwan, discussed "Surface Photodegradation and Modification of Some Substituted Polyacetylene Films." Electroactive conjugated polyacetylenes have attracted a great deal of attention because of their interesting electrical/electronic properties. Substituted polyacetylenes are thermally more stable than polyacetylene in air, and their thermal stability increases with



Tom Spurling

increasing number and/or bulkiness of the substituents. In this work the surface photo-stability and degradation behavior of such polymers was studied especially the surface modification and degradation of polyacetylene films with heteroatoms as the substituents.

B. A. Bolto, CSIRO Chemicals and Polymers, Clayton, VIC, Australia, reviewed the role of "Polymers in New Water Treatment Technologies." Improved methods of cleaning up water and waste water by processes based on adsorption and coagulation phenomena have been developed. The initial work on ion exchange for desalination, using resins which could be regenerated with hot water rather than chemicals led to the emphasis on high-rate systems, both for the reaction step and for the separation of the absorbed or accumulated impurities from the purified water.

C. C. Ho, University of Malaya, Kuala Lumpur, Malaysia, described the "Novel Application of Natural Rubber Latex as Natural Flocculant for Tin Tailing Slurry." Natural rubber latex concentrate is essentially a dispersion of negatively charged polyisoprene particles in an aqueous serum phase containing some minor constituents of soluble non-rubbers whereas tin tailing slurry is a very stable dispersion of mainly submicron size clay minerals with some heavier silt particles. It was found that rubber latex in combination with calcium chloride under optimum conditions is an excellent polymeric flocculant giving complete heterocoagulation producing a clear supernatant and a porous sediment.

N. M. Surdia, Institute of Technology, Bandung, Indonesia, lectured on "The Interaction of Additives in Polyblends of Starch and Synthetic Polymers." Polyblends are used in plastics waste management by biodegradation. To undergo biodegradation, the blends should be compatible. In order to obtain a compatible blend, additives are frequently added. These additives can follow different mechanisms of degradation, i.e. chemical reaction, acid base interaction, physical adsorption or adhesion.

Among the contributed papers, one which was particularly interesting was a paper by a daughter/father team, Catherine L.

## Conference Report

Winzor and Donald J. Winzor, on the "Use of Analytical Ultracentrifugation to Evaluate Scission and Crosslinking Yields for Irradiated Polymers."

One of the highlights of Pacific Polymer Conferences, first initiated at the First Pacific Polymer Conference, is a session on "Polymer Science and the Arts." PPC-3 was no exception. An entire day was devoted to this subject which included preservation, restoration, and stabilization of objects of polymeric nature or by using polymers or polymeric materials.

O. Vogl, Polytechnic University, Brooklyn, NY, described his interest in "Oriental Lacquers." The varnish tree "Toxicodendron vernicifluum," also called "Rhus verniciflua," is the common source of Japanese lacquer. The sap of the Japanese lacquer tree consists of about 65% of the oily phase urushiol and an aqueous phase, containing polysaccharides, gums and enzymes, necessary for curing the lacquer. The active ingredients in the urushiol fraction are catechol derivatives substituted in the 3-position with saturated and unsaturated C-15 carbon chains. A novel combination of modern techniques have been applied for the accurate analysis of the individual components of urushiol. UV stabilizers have also been prepared for oriental lacquers. Finally the speaker also showed slides of oriental lacquerware made by the various techniques.

H. Misawa, University of Tokushima, Kyoyo, Japan, presented his work on the "Optical Harmony of Polymeric Microspheres in Solution." Microspheres, such as polymer beads, oil droplets, capsules are known to undergo vigorous Brownian motion in solution. The Brownian motion is a random process and we cannot see any *harmony* in the movement of microspheres. A principal key to produce harmony in microspheres and to select and manipulate individual spheres is the *radiation force of light*. It can act as the driving force for trapping and manipulating of the spheres. This talk concluded with an excellent video showing the laser manipulation of the microspheres.



David H.  
Solomon

Koichi  
Hatada



J. M. Lyall, National Library of Australia, Canberra, ACT, Australia, has a major interest in "Preserving Polymers for Posterity." It is usually accepted that the responsibility for preserving our cultural heritage resides in museums, galleries, libraries and archives. Craft skills of restorers were employed to preserve important materials in public and private collections. As materials are becoming more complex in the 20th century the skills of the restorer require also knowledge of material science. A number of factors need to be considered: Occurrence of polymers in cultural materials, ethical considerations, obsolescence, altering deterioration reactions, effects of conservation treatment and reaction during storage. These considerations must be undertaken with the understanding that resources for this type of work are limited.

D. H. Solomon, University of Melbourne, Melbourne, VIC, Australia presented a history of "Polymers and Money." The Australian \$5 and \$10 banknotes, as well as the \$10 bicentennial banknote, are a sandwich structure, made of oriented polypropylene with a very special emblem that makes the banknotes essentially impossible to counterfeit. They have to have the feel of paper to make them acceptable to the public. The banknotes are expected to have lifetimes more than three times that of present day notes. Australia is now producing plastic based banknotes for several countries. Solomon described the history of the development of a technology that was necessary for the creation of these banknotes.

The 3rd Pacific Polymer Conference had several highlights in addition to the scientific agenda. On Sunday evening there was an informal cocktail party for the participants. The Monday noon was reserved for a Welcome Luncheon for all of the delegates. Wednesday was an important event on the beautiful beach south of Surfer's Paradise with a traditional "Aussie Barbeque." On Thursday evening was the memorable Banquet with the performance of an Aboriginal Dance Group. On the occasion of the banquet, the first awards of distinguished service for Polymer Science in the Pacific Region were awarded to the first and second Presidents of the Pacific Polymer Federation, Professors Otto Vogl and Takeo Saegusa.

At the Departing Luncheon on Friday for all participants, it was concluded that our Australian hosts of the PPC have been exceptional hosts for this conference. This meeting has solidified the stature of the PPF and recognized the importance of cooperation in polymer science in the Pacific Basin.





*Aborigine Dance*

Great progress was made in the further development and enlargement of the PPF. Several organizations had applied to be admitted to join the Federation. Polymer organizations from Thailand, Taiwan, Indonesia, Mexico and Vietnam were admitted as new members of the PPF at the Council Meeting.

At the end of the meeting the Presidency of the PPF was handed over from the Australian organization to the American side. The Americans will be responsible for the leadership of the organization and the next conference of the Pacific Polymer Federation. The site for the next conference has been selected and PPC-4 will be held in Kauai, Hawaii in December 1995. It has been decided to hold PPC-5 in Korea in 1997 with Korea as the host country, during which time the presidency of the PPF will be held by a Korean.