Eli Ruckenstein

When one hears the name Eli Ruckenstein, the first thought that strikes one is how could a single individual have worked on heat and mass transfer in laminar and turbulent flows, separation processes, catalysis, colloids and emulsions, polymer membranes, superconducting materials, immobilized enzymes, nucleation, stability of thin films and foams, design of antifouling surfaces, thrombus growth, etc., etc. It is simply overwhelming that one and the same person can contribute significantly and in such depth to so many widely different areas of chemical engineering. Added to this is the unusual fact that Eli's work has involved both theoretical and experimental aspects in most of these fields. To think of Eli Ruckenstein as an outstanding researcher, a dedicated teacher, and an inspiring mentor of many academic and industrial chemical engineers captures only a partial image of his persona. Indeed, he is among the select few in the community of international chemical engineering and in the history of our profession. It is our pleasure and privilege to dedicate this *festschrift* issue of *Industrial & Engineering Chemistry Research* to him. We are very grateful to the Editor of *Ind. Eng. Chem. Res.*, Donald R. Paul, for his enthusiastic support of this effort.

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Eli Ruckenstein received his chemical engineering degree from the Polytechnic Institute of Bucharest in 1949 and joined the Institute as an assistant professor. His graduate education took an unusual path as he has described it some years ago. "By tradition, there were no formal graduate courses offered by the Institute. The library had very few of the books that were available to graduate students in the West and received journals only after a year or more of delay. So *Industrial & Engineering Chemistry* became my graduate school, my textbook, and my teacher. I read each volume in series, some from cover to cover, beginning with Volume I. Although there are some advantages to this procedure, it is most inefficient and is not to be recommended. It is like trying to deduce the plot of a novel by starting in the middle. Without knowledge of earlier developments, I began to understand the papers only through stubbornness and repetition." This educational process of Eli had its own rewards. As a graduate student from Delaware in later years commented, "Word spread that the best way to do a literature search on any thesis topic was to pay a visit to Ruckenstein's office. His encyclopedic knowledge of the literature on any subject of interest to chemical engineers and his nearly photographic recall of important papers became legendary".

Eli left Romania in 1969 and served as a visiting professor at the University of London and as a senior NSF scientist at Clarkson College for 1 year. This was followed by his arrival at the University of Delaware in 1970, which was to remain his home for the next 3 years. In 1973, Eli Ruckenstein moved to the State University of New York at Buffalo as a Faculty Professor in Engineering and Applied Sciences. He was named to his present position, a University Distinguished Professor, in 1981. In the intervening years, he has been a visiting Professor at the Catholic University of Leuven, Belgium (1977−78), Technion, Haifa, Israel (1978), Bayreuth University, Germany (1986), and Carnegie-Mellon University, Pittsburgh, PA (1988−89).

Most of Ruckenstein's work in Romania had concerned more conventional aspects of heat and mass transfer such as distillation and fluidization and interfacial phenomena. At Delaware, the ready availability of chemical engineering literature created a dramatic change in his research directions, with Eli's interests turning to the areas of catalysis and colloids. At Buffalo, Ruckenstein's research has continued to expand. Ruckenstein boldly ventures into new problem areas unfettered by limits of tradition and aided principally by his physical intuition transforms difficult problems into solvable problems. In the process, problems which appear unrelated become unified in terms of the underlying physical principles. It will take many chemical engineers to assess the contributions of Eli Ruckenstein to the various areas of chemical engineering. Indeed, we know of no other chemical engineer who has worked on as many fields as Eli and who will be able to even describe all of Eli's contributions. We can only briefly mention the breadth of his work by citing the problems he has tackled.

In the area of transport phenomena, examples of Ruckenstein's contributions include a two time and length scales dimensional analysis, physical models for turbulent mass transfer, stability theory for molecularly thin liquid and solid films, theory of anomalous osmosis and reverse osmosis, and a new type of scaling analysis of laminar and turbulent heat and mass transfer.

In the area of catalysis, Ruckenstein has pioneered theoretical treatments of the kinetics and thermodynamics of sintering and redispersion of supported metal catalysts, mechanism of selective oxidation of mixed oxides, electronic theory of poisoning and promoting of metal catalysts, and the role of physical and chemical interactions on the behavior of supported metal catalysts. Of his numerous experimental contributions, we mention the design of pores in alumina, optimum design of diluted zeolite catalysts, and catalytic combustion using mixed oxides. His work has led to the discovery of a new catalyst for carbon dioxide reforming of methane.

Another field that has witnessed the broad expanse of Ruckenstein's efforts is colloids, emulsions, and interfaces. Ruckenstein has pioneered the modern theory of the stability of microemulsions and has explained the origin of low interfacial tensions. His other contributions include thermodynamics and dynamics of wetting, origin of hydration forces, thermodynamics of phoretic motions, interfacial turbulence, Marangoni effect, role of interaction forces in the deposition of colloidal particles and cells, micellization and solubilization in surfactant solutions, phase behavior of mixture of colloidal particles and polymers, and the stability of foams.

Ruckenstein's contributions in bioengineering and medical applications include his work on the deposition of cells on surfaces, the kinetics of thrombus formation, deposition of cancer cells on surfaces, blood compatible surfaces, design of antifouling surfaces, and mechanism of tear film rupture. Ruckenstein has also contributed to the optimization of immobilized enzyme reactions, has studied the effect of electrokinetic phenomena in enzyme reactions, and has developed novel enzyme-pH electrodes.

In recent years, he has turned his attention to the preparation of polymers using novel methods suggested by his work on colloidal systems. Ruckenstein has developed a new approach to prepare composite polymers from incompatible monomers by self-compatibilization. He has developed ways to formulate concentrated emulsions and has exploited such an emulsion pathway to prepare new polymeric membranes for separation processes. Using this approach, he has also developed new polymers with high electrical conductivity.

Ruckenstein has more than 700 journal publications to his credit dealing with this diverse collection of research problems. Through these papers, he serves as an educator for all those who want to embark on solving new problems in traditional or novel areas of chemical engineering. His contributions through such publications are unique for their role in educating the readers as to how the frontiers of chemical engineering can be expanded, how the core ideas of chemical engineering can be applied successfully to other problems, how the order can be generated amid disparate observations, and how unifying principles with intuitive simplicity can be discovered.

Eli Ruckenstein's extraordinary research profile makes him also an unusual teacher and educator in the broad sense. Most students and colleagues at Clarkson, Delaware, and Buffalo would readily recall the departmental seminars. Often the speakers were introduced by Eli and the introduction itself served as the main attraction for all present. Eli would describe the speaker's work, citing articles with detailed knowledge and pointing out

where the seminar leads to, even before the speaker could commence his lecture. Everyone would then eagerly wait for the inevitable questions and comments from Eli that would follow the seminar's conclusion. This has always been a great educational experience for students and colleagues alike. To the speakers, even having Eli as the sole member of the audience would have been gratifying given the sparkle of discussions and illuminating comments.

Eli has a unique teaching method which takes the form of (by now, well-known) independent studies. Each student meets with Ruckenstein and the topic of study is chosen based on the interests of the student. There is no need to worry whether the topic is also of interest to Eli since no area of intellectual enquiry escapes his curiosity. The program of study starts with important books or papers, often initially identified by Ruckenstein. The student meets with Ruckenstein regularly, at least once (only once?) every day to discuss the readings and to contemplate the new set of questions and problems where the study is taking them. The pace of learning, the direction of study, the breadth of literature to be explored, and the generation of new knowledge that would result from the study are all decided for each individual student based on their capacity to keep up with the learning. Even with the weakest student, Ruckenstein accomplishes a level of learning and stimulates a level of intellectual excitement that is never achieved in the conventional classroom setting.

Numerous students have benefited from these independent study courses. For many, these courses became the basis of their thesis research. To other students, these courses helped their entry into new research areas as they embarked on their own careers as young educators. For all students, the independent study activity generated a measure of intellectual self-confidence, familiarity with and an attitude of respect for other scientists who have contributed to the area, and insights into the ways of exploring unknown intellectual territories and quickly sorting the important problems from the mundane. As a teacher, Ruckenstein had to commit unusual amounts of time with each student to follow this pattern of education. The prior background of each student had to be assessed, and a suitable learning process had to be devised. Most significant was the diversity of the topics covered. No student repeated a course taken by any other student before. Over 100 students have had this unusual learning experience with Ruckenstein.

Ruckenstein has guided, trained, and mentored 47 doctoral and postdoctoral students, 20 visiting scholars, and a dozen M.S. students. Many of his students now occupy important positions in industry, universities, and governments in the U.S. and abroad (Romania, India, Taiwan, Korea, Poland, Switzerland, Israel). Their unique learning experience with Ruckenstein and their absorption of at least some elements of Ruckenstein's concern for the individual student in their own careers will contribute to a lasting legacy of Ruckenstein as an educator.

Ruckenstein has been recognized by numerous awards for his role as an educator and as a researcher. He has received the Romanian Department of Education Award for research in turbulent heat and mass transfer (1958), the Romanian National Award for teaching (1961), The George Spacu Award from the Romanian Academy of Sciences for research in surface phenomena (1963), the Romanian Department of Education award for research in distillation (1964), the Alpha Chi Sigma Award (1977) and the William H. Walker Award (1988) from the American Institute of Chemical Engineers, the Senior Humbold Award of the Alexander von Humboldt Foundation (1985), the Creativity Award of the National Science Foundation (1985), and the Award in Colloid and Surface Chemistry (1986) and the E. V. Murphree Award in Industrial and Engineering Chemistry (1996) from the American Chemical Society. He was elected to the National Academy of Enginering in 1990.

Integral to Ruckenstein's achievements has been his wife Velina. Eli has said before that "no one has influenced my life more than Velina." All of Eli's students and colleagues have enjoyed the warm hospitality of their home, the wonderful Romanian food and desserts regularly provided by Velina, and the passionate discussions on many nontechnical subjects, especially, political ideologies that accompanied the social gatherings. A number of his students, indeed, did not have to worry about a food budget since they could conveniently call on Eli and Velina at supper times! Eli has remarkable work ethics. He comes to the office very early every day and spends long hours, the snow days of Buffalo being no exception. In the evenings and nights, the telephone becomes inseparable from him as he continues the day's discussions with all his students.

This festschrift was conceived on the eve of the celebration of Eli's 70th birthday last year. Now at 71, Eli not only shows no signs of slowing down but is initiating still newer areas of research and maintains a productivity unparalleled in the chemical engineering world. The list of publications given below cover the past three years and provide an illustration of Ruckenstein's productivity, versatility, depth, and creativity. We know that these characteristics are not going to change, and we wish him continued success.

Recent Publications

Ruckenstein, E.; Wu, N. L. Synthesis of Tl-based High-T_c Superconductive Oxides. In *Thallium-Based High-Temperature Superconductors*; Hermann, A. M., Yakhmi, J. V., Eds.; Marcel Dekker, Inc.: New York, 1994; p 119.

Tsekov, R.; Ruckenstein, E. Dimple Formation and Its Effect on the Rate of Drainage in Thin Liquid Films. *Colloids Surf.* **1994**, *82*, 255.

Ruckenstein, E.; Khan, A. Z. Synergistic Effects of Superbasic Catalysts on the Selective Formation of Acrylonitrile via Oxidative Methylation of Acetonitrile with Methane. *J. Catal.* **1994**, *145*, 390.

Tsekov, R.; Ruckenstein, E. Stochastic dynamics of a subsystem interacting with a solid body with application to diffusive processes in solids. *J. Chem. Phys.* **1994**, *100* (2), 1450.

Ruckenstein, E.; Smirniotis, P. G. Two sources of synergism in the reforming of *n*-hexane, methylcyclopentane, methylcyclohexane mixtures over composites of basic and acidic zeolites. *Catal. Lett.* **1994**, *24*, 123.

Narsimhan, G.; Ruckenstein, E. Structure, Drainage and Coalescence of Foams and Concentrated Emulsions. in *FOAMS*; Prud'homme, R. K., Khan, S. A., Eds.; Surfactant Science Series Vol. 57; Marcel Dekker, Inc.: New York, 1996; p 99.

Smirniotis, P.; Ruckenstein, E. The Synergism of Pt/δ-Al_2O_3 and Pt/β Zeolite in the Reforming of Naphthenes. *Ind. Eng. Chem. Res.* **1994**, *33*, 493.

Tsekov, R.; Ruckenstein, E. Resonant Diffusion of Molecules in Solids. *J. Chem. Phys.* **1994**, *100* (5), 3808.

Ruckenstein, E.; Wang, X. Production of Lignin Peroxidase by Phanerochaete Chrysosporium Immobilized on Porous Poly(Styrene−Divinylbenzene) Carrier and Its Application to the Degrading of 2-Chlorophenol. *Biotechnol. Bioeng.* **1994**, *44*, 79.

Smirniotis, P.; Ruckenstein, E. Comparison of the Performance of ZSM-5, β Zeolite, Y, USY and Their Composites in the

Catalytic Cracking of *n*-Octane, 2,2,4,-Trimethylpentane and 1-Octene. *Ind. Eng. Chem. Res.* **1994**, *33*, 800.

Sun, F.; Ruckenstein, E. Membranes of Block Copolymer−Poly-(divinylbenzene) Blends for the Pervaporation of Alcohol/Water Mixtures. *J. Membr. Sci.* **1994**, *90*, 275.

Hong, L.; Ruckenstein, E. Immobilization of Alkoxylated Phosphine Ligands and Their Rh Complexes to a Silica Surface Coated with an Organic Mono or Multi-Layer. *J. Mol. Catal.* **1994**, *90*, 303.

Smirniotis, P.; Ruckenstein, E. Maximum and Time Stable Aromatic Yield in the Reforming of Alkylcyclopentanes over Pt/β Zeolite. *Catal. Lett.* **1994**, *25*, 351.

Ruckenstein, E.; Li, H. The Tensile Behavior and Toughness of Poly(Vinylidene Chloride)/Poly(Butyl Methacrylate) Composites Prepared by the Concentrated Emulsion Approach. *Polymer* **1994**, *35*, 4343.

Ruckenstein, E.; Tsekov, R. Diffusion of Atoms and Dimers on Metal Surfaces. *J. Chem. Phys.* **1994**, *100*, 7696 (1994).

Ruckenstein, E. Thermal and Diffusion Boundary Layers in Viscoelastic Flows. *Ind. Eng. Chem. Res.* **1994**, *33*, 2331.

Ruckenstein, E.; Li, H. Toughened Polystyrene Composites by the Concentrated Emulsion Pathway. *J. Appl. Polym. Sci.* **1994**, *52*, 1949.

Wang, X.; Ruckenstein, E. Immobilization of Phanerochaete Chrysosporium on Porous Polyurethane Particles with Application to Biodegradation of 2-Chlorophenol. *Biotechnol. Techn.* **1994**, *8*, 339.

Ruckenstein, E.; Hong, L. Conducting Rubber-Like Copolymer−Carbon Fiber Composites. *J. Appl. Polym. Sci.* **1994**, *53*, 923.

Ruckenstein, E. The Thermodynamics of Microemulsions Revisited. *Langmuir* **1994**, *10*, 1777.

Ruckenstein, E.; Li, H. Rubber Toughened Styrene/Methyl methacrylate/Butyl Methacrylate Composites by the Concentrated Emulsion Pathway. *J. Appl. Polym. Sci.* **1994**, *54*, 561.

Ruckenstein, E.; Sun, F. Anomalous Sorption and Pervaporation of Aqueous Organic Mixtures by Poly(vinyl acetal) Membranes. *J. Membr. Sci.* **1994**, *95*, 207.

Ruckenstein, E. Concentrated Emulsion Pathway to Toughened Polymeric Materials. *Rev. Roum. Chim.* **1994**, *39*, 1279.

Ruckenstein, E.; Bhakta, A. Clustering and Its Effects on Adsorption. *Langmuir* **1994**, *10*, 2694.

Smirniotis, P. G.; Ruckenstein, E. The Effect of Pt/Al Sites Ratio on the Performance of Pt/β Zeolite in the Reforming of Alkylcyclopentanes. *Appl. Catal.* **1994**, *117*, 75.

Ruckenstein, E.; Hong, L. Inverted Emulsion Pathway to Polypyrrole and Polypyrrole Elastomer Composites. *Synth. Met.* **1994**, *66*, 249.

Ruckenstein, E.; Reddy, B. M. Oxidative methylation of α, β, and δ-picolines with methane to vinylpyridines and ethylpyridines over mono and bialkali promoted magnesia catalysts. *Catal. Lett.* **1994**, *29*, 217.

Ruckenstein, E.; Li, H. Semi Interpenetrating Polymer Network Latexes via Concentrated Emulsion Polymerization. *J. Appl. Polym. Sci.* **1995**, *55*, 961.

Tsekov, R.; Ruckenstein, E. Brownian dynamics in amorphous solids. *J. Chem. Phys.* **1994**, *101*, 7844.

Ruckenstein, E. The Moving Contact Line of a Droplet on a Smooth Solid. *J. Colloid Interface Sci.* **1995**, *170*, 284.

Sun, F.; Ruckenstein, E. Sorption and pervaporation of benzene−cyclohexane mixtures through composite membranes prepared via concentrated emulsion polymerization. *J. Membr. Sci.* **1995**, *99*, 273.

Ruckenstein, E. Sintering and Catalytic Implications. A Surface Thermodynamics Approach. Catalyst Deactivation 1994. *Stud. Surf. Sci. Catal.* **1994**, *88*, 33.

Ruckenstein, E.; Hong, L. Coating Water-Swellable Polymer Latexes by Interfacial Polymerization. *J. Appl. Polym, Sci.* **1995**, *55*, 1081.

Rajaiah, J.; Ruckenstein, E.; Andrews, G. F.; Forster, E. O.; Gupta, R. K. Rheology of Sterically Stabilized Ceramic Suspensions. *Ind. Eng. Chem. Res.* **1994**, *33*, 2336.

Smirniotis, P.; Ruckenstein, E. Increased Aromatization in the Reforming of Mixtures of n-Hexane, Methylcyclopentane and Methylcyclohexane over Composites of Pt/BaKl Zeolite with Pt/β or Pt/USY Zeolites. *Appl. Catal.* **1995**, *123*, 59.

Li, H.; Ruckenstein, E. AB Crosslinked Polymer Latexes via Concentrated Emulsion Polymerization. *Polymer* **1995**, *36*, 2281.

Sun, Y.; Ruckenstein, E. Polypyrrole-bearing Conductive Composite Prepared by an Inverted Emulsion Pathway Involving Nonionic Surfactants. *Synthetic Metals* **1995**, *72*, 261.

Reddy, B. M.; Ruckenstein, E. Oxidative Methylation of Organic Compounds with Methane Over Alkali Promoted MgO Catalysts. *Appl. Catal. A* **1994**, *121*, 159.

Li, H.; Ruckenstein, E. Polybutadiene/Polystyrene Network Composites Prepared Via Concentrated Emulsion Polymerization. *Polymer* **1995**, *36*, 2647.

Bhakta, A.; Ruckenstein, E. Drainage of a Standing Foam. *Langmuir* **1995**, *11*, W1486.

Ruckenstein, E.; Sun, F. Hydrophobic−Hydrophilic Composite Membranes for the Pervaporation of Benzene−Ethanol Mixtures. *J. Membrane Sci.* **1995**, *103*, 271.

Ruckenstein, E.; Liang, L. Polyacrylamide-Reactive Styrene/Unsaturated Polyester Microgel Composites. *J. Appl. Polym. Sci.* **1995**, *57*, 605.

Ruckenstein, E.; Hong, L. Sedimentation Polymerization. *Polymer* **1995**, *36*, 2857.

Smirniotis, P.; Ruckenstein, E. Alkylation of Benzene or Toluene with MeOH or C_2H_4 over ZSM-5 or β zeolite: Effect of the Zeolite Pore Openings and of the Hydrocarbons Involved on the Mechanism of Alkylation. *Ind. Eng. Chem. Res.* **1995**, *34*, 1517.

Hong, L.; Ruckenstein, E. Metal Carbonyl Anion Loaded Molecular Reservoir Particles−Application to the Catalytic Synthesis of Two Styrene Oxide Derivatives. *J. Mol. Catal. A Chem.* **1995**, *101*, 115.

Sun, Y.; Ruckenstein, E. Poly(3-methyl thiophene)−rubber Conductive Composite Prepared via An Inverted Emulsion Pathway. *Synth. Metals* **1995**, *74*, 145.

Liang, L.; Ruckenstein, E. Polyvinyl alcohol−polyacrylamide interpenetrating polymer network membranes and their pervaporation characteristics for ethanol−water mixtures. *J. Membr. Sci.* **1995**, *106*, 167.

Ruckenstein, E.; Sun, Y. Polyaniline-containing Electrical Conductive Composite Prepared by Two Inverted Emulsion Pathways. *Synth. Met.* **1995**, *74*, 107.

Hu, Y. H.; Ruckenstein, E. Pulse-MS Study of the Partial Oxidation of Methane Over Ni/La_2O_3 Catalyst. *Catalysis Lett.* **1995**, *34*, 41.

Ruckenstein, E.; Li, H. Self-compatibilization of Polymer Blends via Concentrated Emulsions. *Polym. Bull.* **1995**, *35*, 517.

Ruckenstein, E.; Sun, F. Concentrated Emulsion Pathway to Novel Composite Polymeric Membranes and Their Use in Pervaporation. *Ind. Eng. Chem. Res.* **1995**, *34*, 3581.

Ruckenstein, E.; Li, B. A Surface Equation of State Based on Clustering of Surfactant and Molecules of Insoluble Monolayers. *Langmuir* **1995**, *11*, 3510.

Tsekov, R.; Ruckenstein, E. Two Dimensional Brownian Motion of Atoms and Dimers on Solid Surfaces. *Surf. Sci.* **1995**, *344*, 175.

Bhakta, A.; Ruckenstein, E. Ostwald Ripening: A Stochastic Approach. *J. Chem. Phys.* **1995**, *103*, 7120.

Ruckenstein, E.; Hu, Y. H. CO_2 Reforming of CH_4 Over Ni/Alkaline Earth Metal Oxide Catalysts. *Appl. Catal. A* **1995**, *133*, 149.

Li, H.; Ruckenstein, E. Mutual Toughening of Vinyl Chloride and Methyl Methacrylate in Network Composites Prepared via Concentrated Emulsion Polymerization. *Polymer* **1996**, *37*, 1933.

Ruckenstein, E.; Hu, Y. H. Near 100% CO selectivity in CH_4 direct catalytic oxidation at low temperatures (<700 °C) under unsteady state conditions. Catal. Lett. **1995**, *35*, 265.

Bhakta, A.; Ruckenstein, E. Foams and Concentrated Emulsions: Dynamics and "Phase" Behavior. *Langmuir* **1995**, *11*, 4642.

Ruckenstein, E.; Liang, L. Pervaporation of ethanol−water mixtures through polyvinyl alcohol−polyacrylamide interpenetrating polymer network membranes unsupported and supported on polyethersulfone ultrafiltration membranes: A comparison. *J. Membr. Sci.* **1996**, *110*, 99.

Ruckenstein, E.; Sun, Y. Synthesis of Surface Conductive Polyurethane Films. *Synth. Met.* **1995**, *75*, 79.

Hu, Y. H.; Ruckenstein, E. Transient Kinetic Studies of Partial Oxidation of CH_4. *J. Catal.* **1996**, *158*, 260.

Hu, Y. H.; Ruckenstein, E. An optimum NiO Content in the CO_2 Reforming of $TXCH_4$ with NiO/MgO Solid Solution Catalysts. *Catal. Lett.* **1996**, *36*, 145.

Ruckenstein, E. Effect of Short Range Interactions on Spreading. *J. Colloid Interface Sci.* **1996**, *179*, 136.

Ruckenstein, E. Concentrated Emulsion Polymerization. *Adv. Polym. Sci.* **1996**, *127*.

Hong, L.; Ruckenstein, E. Conductive Coating Films Based on Low Density of In_2O_3 Powders and Core-Shell Polymer Latexes. *J. Appl. Polym. Sci.* **1996**, *61*, 901.

Ruckenstein, E.; Hong, L. Oxide−Carbon Composites and Porous Metal Oxides Prepared via Water-Swellable Polymer Networks. *Chem. Mater.* **1996**, *8*, 546.

Ruckenstein, E.; Li, B. Phase Transition from a Liquid Expanded to a Liquid Condensed Surfactant Monolayer. *J. Phys. Chem.* **1996**, *100*, 3108.

Liang, L.; Ruckenstein, E. Pervaporation of ethanol−water mixtures through polydimethylsiloxane−polystyrene interpenetrating polymer network supported P?membranes. *J. Membr. Sci.* **1996**, *114*, 227.

Ruckenstein, E.; Li, H. Composites via Heterogeneous Crosslinking of Concentrated Emulsions. *Polymer* **1996**, *37*, 3373.

Ruckenstein, E.; Li, B. A Simple Surface Equation of State for the Phase Transition in Phospholipid Monolayers. *Langmuir* **1996**, *12*, 2308.

Ruckenstien, E.; Hu, Y. H. Interactions between Ni and La_2O_3 in Ni/La_2O_3 Catalysts Prepared Using Different Ni Precursors. *J. Catal.* **1996**, *161*, 55.

Zeng, X.; Ruckenstein, E. Supported Chitosan−dye Affinity Membranes and Their Adsorption of Proteins. *J. Membrane Sci.* **1996**, *117*, 271.

Bhakta, A.; Ruckenstein, E. Modeling of the Generation and Collapse of Aqueous Foams. *Langmuir* **1996**, *12*, 3089.

Ruckenstein, E.; Li, H. Room Temperature Initiated and Self-heating Polymerization via Concentrated Emulsions: Applications to Acrylonitrile Based Polymers. *Polym. Bull.* **1996**, *37*, 43.

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