Journal of Solid State Chemistry **167,** 265–266 (2002)
doi:10.1006/jssc.2002.9726

PREFACE

Galen D. Stucky on the Occasion of his 65th Birthday

Galen Stucky was born in McPherson, Kansas, on December 17, 1936. After obtaining his B.S. at McPherson College in 1957, he moved to the Chemistry Department at Iowa State University, where he received his Ph.D. in 1962 under the supervision of Robert Rundle. This was followed by a postdoctoral fellowship at Massachusetts Institute of Technology (1962), where he worked in the group of Clifford Shull (1994 Nobel Prize in Physics). Stucky initially chose to pursue a career in academia, and he duly joined the faculty in the Chemistry Department at the University of Illinois in 1964, rising to the rank of full professor in 1972. However, in 1979 a change of direction took him to Sandia National Laboratory in Albuquerque, where he led the Solid State Materials Group, and then to the Central Research and Development Laboratory of E. I. du Pont de Nemours & Co. in Wilmington, where he was a group and research leader from 1981 to 1985. Since 1985, Stucky has been a professor in the Department of Chemistry and Biochemistry at the University of California, Santa Barbara, and a professor of materials since 1993.

Professor Stucky's early research at the interface of crystallography and organometallic chemistry resulted in major contributions to our understanding of main group metal–organic molecular assemblies. He first identified and demonstrated the structural and stereochemical roles of directed covalent, main group metal–organic (pΠ–pΠ, pσ–pΠ, metal–alkyl hydrogen) bonding and the factors leading to oligomerization of organomagnesium, organolithium, and mixed main group metal organometallics. He showed how one could use reversible early transition metal–lilgand electron transfer to selectively activate aromatic C–H bonds. In the area of deformation density studies by a combination of X-ray and neutron diffraction, Stucky was the first to experimentally measure the aspherical valence electron density associated with 3-member ring bent bonds, epoxide oxygen atom lone pairs, and C$\equiv$N triple bonds.

Stucky's more recent work is remarkable for both its impact and its breadth, as the following samples show:

(1) Stucky and his co-workers have made important contributions to the synthesis of zeolites and molecular sieves (commercially important nanoporous catalysts and adsorbents). The work has led to new varieties of these materials, including zeotype structures with chiral framework topologies, and incorporating transition metals. Early on, Stucky also recognized the potential of these materials to serve as nanoreactors for the synthesis of inorganic solids in the quantum confinement regime. This approach led to a first generation of nano-structured materials with unique physical properties.

(2) His research on the synthesis and processing or ordered inorganic-surfactant mesophases and mesoporous solids has expanded the technological promise of these materials far beyond the catalytic applications originally envisaged. He was the first to demonstrate the use of the isoelectric point and acid catalysis of silica to create highly ordered porous silica structures. This and other synthetic methods developed in Stucky's lab have allowed main group and transition metal oxide mesoporous

0022-4596/02 $35.00

materials, which have pores 1.5 to 50 nm across, to be prepared with much greater control and in many different forms. In the assembly of organic/inorganic composite structures, he has shown how one can create, in a single continuous process, three-dimensional hierarchically patterned composite domains on the nano-, meso-, submicrometer, and micrometer length scales.

(3) Investigations into mesoporous silica thin films synthesized at UCSB suggest that these are excellent candidates for ultralow-dielectric coatings for microelectronic chips. And concurrent molecular assembly of optical species with block copolymers and molecular inorganic precursors has been used in Stucky's lab to create high-surface-area optical waveguides with both photonic and mesoscale patterning, a variety of micro array lasers, high-surface-area chemical sensors, and optical switches.

(4) Stucky also has made important contributions in the filed of biomineralization, the process by which biological organisms assemble intricate inorganic structures under genetic control. The insights that he and his co-workers have gained into this process are helping them to develop entirely new approaches to synthesizing complex multicomponent materials under environmentally benign conditions. Particularly noteworthy is the ability to mimic the biomineralization functionality of proteins on the benchtop and the use of synthetic block polymer polypeptides to organize inorganic species into desired morphologies and structures on multiple length scales.

It has been said of Galen Stucky that he draws superlatives like a magnet attracts iron filings. He is certainly recognized by colleagues around the world as one of the most innovative and productive researchers worldwide in developing new strategies for synthesizing and processing novel solid-state materials. He has brought a unique perspective to the concept of materials and has been the driving force for some of the most original and important work in the field. He draws not only on chemistry but also on the fields of biology, physics, and chemical engineering for inspiration and techniques, and at UCSB he has developed long-standing and productive collaborations with faculty members in those departments. That breadth of interest has undoubtedly contributed to the enormous influence his work has had on materials research. This impact is also reflected by the large number of previous students and postdocs who have started their own academic careers in the United States and worldwide.

The esteem in which Galen Stucky is held, both nationally and internationally, is reflected in the number of recent honors that he has received. These include an Alexander von Humboldt Senior US Scientist Award (2000), the Herbert H. Johnson Memorial Lectureship at Cornell University (2001), and the prestigious Chemistry of Materials Award of the American Chemical Society (2002). Given his extraordinary record of accomplishment, it is remarkable to observe that, at the age of 65, Galen is in the midst of the most scientifically productive period of his extraordinary career. In the past few years, he has published typically 30 or more papers each year, and over 300 of his 490 papers have been published on work done at UCSB since he arrived in 1985. This special issue of the *Journal of Solid State Chemistry* reflects the respect, admiration, and fondness of his many friends and colleagues from around the world. We wish him continuing success and happiness in the years to come, supported, as always, by his wife, Kaaren, and their two sons, David and Mark.

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