

Foreword

Toward "Macro-", Again

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Soon after the DOE report entitled "Research Opportunities on Clusters and Cluster Assembled Materials" was published in 1988, they came up on the research scene as the two late news evening sessions at the MRS Fall Meetings in Boston, that is, "Buckyballs(fullerenes)" in 1990 and "light-emitting Si" in 1991. Before then, isolated clusters like fullerenes generated by laser ablation had not been successfully formed into bulky materials retaining their individual properties. In that session, fullerenes entered the limelight by exhibiting their abilities to be generated in large quantities and to act as rigid building blocks to form bulky materials with mesoscopic periodicity. I remember a TV crew near my seat mumbled, "It's gonna be long.", and did well to order sandwiches in preparation for overnight session. In 1991, I was able to contribute to the session on "light-emitting Si" myself, presenting the first data on excitation spectroscopy. Everyone was so eager to be the first to present new data that the session became very tense. I also remember one presentation being interrupted by a shout of "I don't see any!" when lattice images of Si clusters were pointed in an electron micrograph of light-emitting Si projected on a screen. After that, extensive research efforts as typically presented in this special issue have built up the present tide of "nano-technology". Here, let me see what comes next. To handle nm-scale building blocks naturally means to handle a large number of them. After we know the functions of individual blocks and their interactions, it should become important how to utilize their collective behaviors. This does not mean going back to the conventional macroscopic approach for continua. Rather, as the bottom-up approaches of "cellular automata" are working on collectivity in computational physics in distinction from the top-down approaches based on fundamental differential equations for continua such as finite element methods and the reductionistic approaches such as quantum chemistry and molecular dynamics, our experimental research should also work on collectivity. The situation is quite like a scene of marathon race near the halfway turning point where the majority rushes toward "micro-", whereas the top group is leaving toward "macro-", again.