

Machine Learning for Developing Understanding in Soft Matter Systems

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Sanat Kumar is the leading researcher in the field of polymer nanocomposites. His studies of the dispersion and self-assembly of nanoparticles in a polymer matrix, the transport properties and dynamics of these systems, and the effect of grafting polymers to these particles have broken many boundaries in this research area and have changed the way scientists and engineers think about these systems.

Kumar's earlier work on polymer thin films include several firsts, including the first computer simulations of confined polymers, and the first experiment to determine polymer conformations in thin films. He has worked on a broad set of polymer problems, including the structure and thermodynamics of polymer blends, computer simulation methods for polymers, neutron scattering methods for polymers, polymers in supercritical fluids, polymers in thin films, crystalline/amorphous blends, protein stability and crystallization, and polymer nanocomposites.

Kumar received a BTech in chemical engineering from the Indian Institute of Technology, Madras, in 1981 and SM and ScD degrees in chemical engineering from the Massachusetts Institute of Technology in 1984 and 1987, respectively. He joined the faculty of Columbia Engineering in 2006 and was chair of the department of chemical engineering from 2010 to 2016. During this time, the department grew substantially both in size and in its national rankings. Since 2020, Kumar has also held a joint appointment as a senior scientist at Brookhaven National Laboratories, Upton, NY. He has co-authored more than 280 publications, with 23 papers cited more than 200 times. He was the 2022 recipient of the Polymer Physics Prize from the American Physical Society.