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Nanoscale organization of polymer-nanoparticle assemblies: From biological nanopores to smart polymers

Nuclear Pore Complex (NPC) is a key cellular transporter that spans the nuclear envelope and controls nucleocytoplasmic transport in eukaryotic cells. NPC is involved in large number of regulatory processes. It is a remarkable device that robustly carries highly selective and rapid macromolecular transport. NPC transport mechanism has inspired creation of selective bio-mimetic nanopores for bio-nano-technology applications. The centerpiece of the NPC transport is the assembly of polymer-like intrinsically disordered polypeptides that line its passageway. The conformational dynamics of these polymer-like molecules and their interactions cargo-carrying transport proteins underlie the NPC ability to selectively transport hundreds of cargoes per second in crowded and noisy cellular environment. I will present recent insights into the organization and function of the NPC and man-made polymer-functionalized channels and surfaces, arising from systematic comparison of computational and theoretical results with experimental data, and discuss how these results suggest strategies for creation of selective stimuli-responsive nanomaterials.

Biography

Anton Zilman was trained as a Physicist and currently his group works on a number of problems on the interface of physics, biology and engineering.

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