**Soft Materials and Complex Fluids via Block Copolymer Self-Assembly:**

**From (Nano)Structure to Function to Applications**

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 Soft materials, also known as complex fluids, present diverse and interesting properties and function which emanate from nano- and meso-scale organization of constituents such as polymers, particles and solvents. Prime examples of tunable materials are polymers, in particular, block copolymers comprising covalently-linked blocks of different chemical nature or conformation. Selective solvents may disrupt certain types of polymer organization but can promote others. Added solvents thus provide valuable degrees of freedom for controlling the morphology and, hence, structure/property relationships, of polymers and can dramatically affect the local mobility. Incorporation of “hard” (metallic, ceramic, semiconductor) nanoparticles into a “soft” polymer matrix can modify dramatically the structure and dynamics, and also confer novel properties (mechanical, optical, electrical, catalytic).

 The presentation will highlight the interplay between (A) fundamental aspects (interactions, thermodynamics, structure, dynamics) of soft materials based on block copolymer self-assembly in selective solvents, and (B) applications of such self-assembled systems in the (a) structuring of waterborne complex fluids with properties tailored for pharmaceutics, (b) environmentally benign synthesis of nanoparticles in a size- and shape-controlled manner, and (c) formulation of polymer gels with ionic liquids as potential electrolytes for energy applications.

 Paschalis Alexandridis is a UB Distinguished Professor in the Department of Chemical and Biological Engineering, University at Buffalo (UB), The State University of New York (SUNY), where he has served as Acting Associate Dean for Research and Graduate Education in UB’s School of Engineering and co-Director of the Materials Science and Engineering program. He has a PhD in chemical engineering from MIT and has carried out postdoctoral research in polymer and surfactant physical chemistry at Lund University.

 Alexandridis’ research utilizes molecular interactions and supramolecular assemblies to develop products with desired properties and function. Ongoing projects address structuring via self-assembly and directed assembly, dispersants, nanocomposites, ionic liquid solvents, polymer electrolytes, and polymer dissolution. He has authored over 140 journal articles (cited over 9500 times) and is coinventor of 6 US patents on pharmaceutical formulations, superabsorbent polymers, and nanomaterial synthesis.

 Alexandridis is a Fellow of the American Association for the Advancement of Science (AAAS) (2012), and the recipient of the American Chemical Society (ACS) Schoellkopf Medal (2010), Bodossaki Foundation Academic Prize in Applied Science (2005), SUNY Chancellor's Awards for Excellence in Scholarship and Creative Activity (2011) and in Teaching (2006), and UB’s Excellence in Graduate Student Mentoring Award (2012). He currently serves on the Executive Committee of the ACS Division of Colloid and Surface Chemistry, and has chaired Area 1C: "Interfacial Phenomena" of the American Institute of Chemical Engineers (AIChE).