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Combinatorial Methods for Polymer Physics: Tools for discovery that enable knowledge generation

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There is no doubt that the advent of combinatorial and high-throughput experimental methods has revolutionized industrial materials discovery by accelerating the research and development of a huge variety of materials systems and devices. This is because "combi" techniques enable researchers to approach large, complex variable spaces in a more rapid, thorough and rational manner. Accordingly, these methods hold great potential for polymer physicists who are increasingly faced with more intricate molecular architectures, more complicated properties interrelations, and more convoluted behaviors from the systems they consider. As demonstrated in recent years, when combi tools are directed towards "knowledge generation" and complex materials science problems, academic researchers can reap the benefits that industrial practitioners of these techniques have seen in discovery and engineering. In this talk we will discuss some key combi and high-throughput tools for polymer research, and demonstrate how they can be applied to key problems in polymers physics. Topic areas will include thin film polymer stability and wetting, block copolymer morphology and phase behavior, polymer surfaces and interfaces, and the structure and behavior of polymer solutions.