

# Guest editorial: Special review section on combinatorial and high-throughput polymer science

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This Special Review Section of *The Journal of Materials Science* presents articles featuring several unique developments in the field of combinatorial and high-throughput polymer science. Recent years have witnessed the expansion of combinatorial library design and high-throughput screening ideas, practiced widely in drug-discovery, into many new areas of materials science. These include semiconductors, catalysts, photoluminescent materials, and polymers. Polymers (and materials in general) represent a distinct challenge to high-throughput characterization, primarily because of the large range of adjustable parameters, multiple phase transitions and microstructures, and the extreme dependence on processing history. Here, the focus is not only on *discovery* of a new composition (as in drug or catalyst development) but equally as well on the *discovery of knowledge*, e.g., characterization of trends, testing hypotheses, and developing structure-property-processing relationships. For these reasons, completely new tools have been necessary for creation of combinatorial libraries and high-throughput chemical and physical analysis. The papers selected for this review section present recent key innovations along the road to developing and applying these new library preparation and screening methods. The section starts off with a comprehensive review of recent developments in high-throughput polymer science, not covered in the other articles (J. Carson Meredith, *Georgia Tech.*). The specific topics covered in the articles include combinatorial studies of polymer adhesion (Prof. Alfred Crosby, *University of Massachusetts, Amherst*), polymer nanocomposites (Dr. Jeff Gilman *et al.*, *NIST*), polymer rheology (Prof. Victor Breedveld, *Georgia Tech.*, and Prof. David Pine, *University of California, Santa Barbara*), polymer thin-films and brushes (Prof. Jan Genzer, *North Carolina State University*) and experimental design (Dr. Laurel Harmon, *Striatius, Inc.*). In summary, it is my hope and wish that this review section becomes a helpful reference and learning source to those that are just entering the combinatorial polymer science field and to those who have been there from the start.

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