

Preface: Forum on Polymers for Aerospace Applications

This issue of *ACS Applied Materials & Interfaces* features a Forum focused on the development and application of Polymers for Aerospace Applications. From aircraft engines to low earth orbit to the surface of the moon or Mars, aerospace has provided considerable challenges to the application of materials and interfaces. For example, use of polymer composites offers the ability to reduce weight of aircraft or spacecraft, thereby reducing launch costs, or allowing planes to fly further on less fuel. Polymeric woven fabrics on the outer covering of current space suits provide micrometeorite protection for astronauts at lower weight than other materials. Greater use of polymers in aerospace applications can enable human space flight to Mars or beyond. Future aerospace needs include reduced weight structures, multifunctional materials, polymers for energy storage and generation, electronic materials, sensors, stimuli responsive materials, and polymers with resistance to demanding environments. The work in this field is interdisciplinary, and has spin-off application across a number of industries such as health, transportation, energy, and defense.

The objective of this Forum is to provide the readership with articles relevant to Polymers for Aerospace Applications and to encourage new interest in the field. Each paper in the Forum is authored by groups who are leaders in this research area. The collection includes research articles on structure–property relationships in high-performance matrix resins for the next generation of lightweight composites. Another article describes the design of polymers with microvascular networks created through controlled depolymerization for autonomous functionality in structural composites. Yet another article details the synthesis of monomers that can simplify the targeted production of complex sulfonated polymers for applications ranging from membranes for water purification to energy storage. The Forum also includes a Spotlight article on polyoctahedral silsesquioxane containing polymers for atomic oxygen resistance in low earth orbit. Several articles emphasize the thermal behavior of polymers for specific aerospace applications. One article highlights the importance of interfaces in the design of polymer nanocomposites with higher thermal conductivity for heat dissipation, whereas another describes the design of porous polyimide aerogels with very low thermal conductivity for insulation for inflatable decelerators for entry, descent, and landing applications. Another article describes the importance of controlling thermal expansion properties of structures through the use of macro-nano hybrid polymer composite laminates. As a whole, the articles in this Forum highlight the significant progress that continues to be made in the development of new polymers for aerospace applications, and the need for more research to meet future challenges.

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