DESCRIPTION

Polymer Degradation and Stability publishes articles which enhance and develop our fundamental understanding of degradation reactions, their control or utilization for sustainability purposes including upcycling or recycling, and material performance optimization via polymer design. These are the major goals of practitioners of the many diverse aspects of modern polymer technology. In addition, PDST seeks comprehensive reviews and guiding opinions in this area of research and polymer applications. For high level impact, PDST focuses on the underlying polymer science and mechanistic understanding as the origin for material ageing, controlled depolymerization (or upcycling opportunities), and how to accomplish maximum performance or improved material lifetime predictions. Favored work for PDST should explain the correlation between the chemical structure and the resulting properties of polymers, paying particular attention to the chemical pathways that describe the decomposition phenomena, result in material weakness, or can be exploited to increase performance and/or reuse. Please note that PDST is not the journal of choice for material testing, screening studies of comparative performance evaluations, or the simple reporting of thermal decomposition observations.

Deteriorative reactions occur during processing, when polymers are subjected to heat, oxygen and mechanical stress, and during the useful life of materials when oxygen and sunlight are the most important degradative initiators. In more specialized applications, degradation may be induced by high energy radiation, ozone, atmospheric pollutants, mechanical stress, biological action, hydrolysis and other influences including combined detrimental environments. The mechanisms of these reactions and stabilization processes must be understood if the technology and application of polymers are to continue to advance. Detailed investigations and in-depth novelty of this kind are therefore a major purpose of the PDST journal.

In addition, there are also new developments in polymer technology in which degradation processes are positive for applications. For example, photodegradable plastics are now available, the recycling and upcycling of polymeric products will become increasingly important, degradation and combustion studies are involved in the definition of fire hazards associated with polymeric materials and the microelectronics industry is vitally dependent upon polymer degradation in the manufacture of its circuitry. Another growing area are biobased polymers and how they compare with traditional materials in their degradation features. Polymer properties may also be improved by processes like curing and grafting, the chemistry of which can be closely related to that which causes physical deterioration in other circumstances. Further, the field of network polymers (thermosets) including bond exchange vitrimers or self-healing materials have often intriguing aspects of polymer degradation science embedded in their features. Radiation of various kinds is used to initiate many
of these modern technological processes meaning that polymer photochemistry has gained new relevance, and therefore also finds a major place in this journal.

The study of all these processes makes extensive use of modern instrumental analytical methods and the various spectrometric, chromatographic, thermal analysis, degradation rate and performance monitoring techniques have been particularly prominent. With the current advances in DFT and molecular modeling, leading all the way to macroscopic 'models' focused on kinetics or spatial dependency, ideally any efforts that consider PDST as a publication medium will clearly demonstrate the outstanding mechanistic questions and how modeling can assist to resolve these. The benefit of modeling should be shown through a clear connection to novelty in degradation pathways or explanations for complex mechanisms and should ultimately close the loop with guidance for new experimental work.

Our efforts will bridge between polymer physics, chemistry and materials science coupled with suitable diagnostics. Yet this also means that PDST is not the journal of choice for mostly empirical comparisons of materials performance, engineering testing of material samples or composites, or easy observations of thermally induced pyrolysis, as every polymer will degrade under some conditions. Instead, PDST wishes to assist with the why and how, thereby offering a comprehensive understanding and meaning of polymer degradation processes for better materials or closing the loop towards reuse and sustainability with a reduced carbon footprint. There is clearly a strong linkage between investigations in the various parts of this field. Polymer Degradation and Stability is a selective journal that provides a forum for publications of guiding nature and novelty, broad understanding, and high-level impact in this field.

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Polymer Scientists and Technologists.

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INTRODUCTION

Polymer Degradation and Stability deals with the degradation reactions and their control which are a major preoccupation of practitioners of the many and diverse aspects of modern polymer technology.

Deteriorative reactions occur during processing, when polymers are subjected to heat, oxygen and mechanical stress, and during the useful life of the materials when oxygen and sunlight are the most important degradative agencies. In more specialised applications, degradation may be induced by high energy radiation, ozone, atmospheric pollutants, mechanical stress, biological action, hydrolysis and many other influences. The mechanisms of these reactions and stabilisation processes must be understood if the technology and application of polymers are to continue to advance. The reporting of investigations of this kind is therefore a major function of this journal.

However there are also new developments in polymer technology in which degradation processes find positive applications. For example, photodegradable plastics are now available, the recycling of polymeric products will become increasingly important, degradation and combustion studies are involved in the definition of the fire hazards which are associated with polymeric materials and the microelectronics industry is vitally dependent upon polymer degradation in the manufacture of its circuitry. Polymer properties may also be improved by processes like curing and grafting, the chemistry of which can be closely related to that which causes physical deterioration in other circumstances.

Radiation of various kinds is used to initiate many of these modern technological processes so that polymer photochemistry has come to a new prominence and finds a major place in this journal.

The study of all these processes has made extensive use of modern instrumental analytical methods and the various spectrometric, chromatographic and thermal analysis techniques have been particularly prominent.

There is clearly a strong common bond between investigations in various parts of the field. Polymer Degradation and Stability provides a forum for the publication of their work.

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