Effects of stratospheric ozone depletion and climate change on materials damage.
Andrady, A. L.; Hamid, H. S.; Torikai, A. Engineering Technology Division, Research Triangle Institute, Durham, NC, USA. Photochemical & Photobiological Sciences (2007), 6(3), 311-318. Publisher: Royal Society of Chemistry, CODEN: PPSHCB ISSN: 1474-905X. Journal written in English. CAN 146:446686 AN 2007:249459 CAPLUS

Abstract

Nanoscale inorg. fillers with av. particle sizes smaller by an order of magnitude or more compared to those of conventional fillers are becoming com. available. The efficacy of these fillers used in polymer formulations and particularly their effect as photostabilizers are beginning to be investigated. These may enhance or retard photodegrdn. depending on the surface coating of the particles or their chem. nature. Some recent data indicate their use as effective photostabilizers in some common polymers. However, the potential deleterious interaction of the nanoscale fillers with other additives in the formulation has also been pointed out. Depending on the efficiency of stabilization and the economics of their use nanofillers may provide a useful route to UV-stabilization of plastics and rubber used outdoors. Insufficient data are available at this time to assess their potential impact on material and coatings stabilization. Org. fillers such as lignocellulose continue to be investigated for outdoor applications. Their cost advantage makes them attractive despite the somewhat reduced engineering properties of their composites. Recent reports, however, suggest the photostability of these composites to depend on the source of fiber as well as the processing techniques employed in fabricating products from them. Identification of the key determinants in terms of species, isolation and processing of polymer-wood composites is crit. to developing them for long-term outdoor use. Efforts are continuing on the synthesis of new light stabilizers, particularly those based on a hindered amine light stabilizers (HALS), and on identifying synergistic combinations of known stabilizers for common thermoplastics. Variants of HALS-type stabilizers that reduce the loss of stabilizer via leaching or migration were recently reported. Studies on the permanence of the stabilizers themselves when exposed to solar UV wavelengths have also been reported in recent work.
Identification of relevant mechanisms is important not only to understand the interactions of climate changes and higher UV solar environments with materials damage, but also to guide future design of light-stabilizers.