Stabilization of Polymers against Photodegradation

Rainer Wolf*

Light stabilizers (LS) for polymers are classified according to their stabilization mechanism. The first group of LS are those which prevent the formation of excited chromophores in the polymers, or rapidly quench them back to the ground state. These physically active LS are UV absorbers (UVA) which absorb UV energy and thereby reduce or prevent the formation of excited electronic states in the polymer, and quenchers which take over excitation energy from the excited chromophores in the polymers. The second group of LS stabilize already chemically damaged polymer molecules, before degradation under chain scission occurs. These chemically active LS are radical scavengers which cure reactive radicals, and hydroperoxide decomposers which transfer hydroperoxides to more stable species without generation of free radicals, or before polymer breakdown.

The chemistry as well as the mechanism of stabilization are discussed for various UVA (2-hydroxybenzophenones, 2-(2'-hydroxyphenyl)benzotriazoles, 2-hydroxyphenyltriazines, oxalanilides, formamidines, salicylates, and cinnamates), quenchers (Ni complexes), radical scavengers (UVA) which absorb UV energy and thereby reduce or prevent the formation of excited electronic states in the polymer, and quenchers which take over excitation energy from the excited chromophores in the polymers. The second group of LS stabilize already chemically damaged polymer molecules, before degradation under chain scission occurs. These chemically active LS are radical scavengers which cure reactive radicals, and hydroperoxide decomposers which transfer hydroperoxides to more stable species without generation of free radicals, or before polymer breakdown.

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Photodynamic Therapy and Photodetection of Early Cancer

Hubert van den Bergh*

The optical properties of dyes that localize preferentially in superficial early cancer can be used to detect and treat the malignant tissue. For photodetection we use the fluorescent properties of these dyes. For photodynamic therapy (PDT) dyes are selected with high triplet yields and long triplet lifetimes that can give rise to efficient singlet oxygen production which results in local phototoxicity and destruction of the neoplastic tissue.

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