Thermo-Oxidative Stability of High Performance Composites under Thermal Cycling Conditions

SANG-HO LEE AND JAE-DO NAM*
Department of Polymer Science and Engineering
Sung Kyun Kwan University
300 Chunchun-Dong, Jangan-Ku
Suwon 440-746, Korea

KYUJONG AHN
Suk Kwang, Co. Ltd.
685 Yuksam-Dong, Kangnam-Ku
Seoul, Korea

KI-MO CHUNG AND JAMES C. SEFERIS
Polymeric Composites Laboratory
Department of Chemical Engineering
Box 351750
University of Washington
Seattle, WA 98195-1750

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ABSTRACT: Thermo-oxidative stability of high performance composites was investigated under thermal cycling conditions between room and 177°C curing temperature. For the analysis of thermal cycling experimental results, an equivalent cycle time (ECT) was developed by applying degradation-reaction kinetic theories to thermal-cycling conditions. Applying this methodology to the weight loss measurements of composite specimens, thermal cycling was found to exhibit a slower weight-loss degradation rate than isothermal conditions. This observation seemed to result from a retarded diffusion rate of oxygen through the viscoelastic relaxation of the epoxy matrix exposed to the thermal cycling conditions. In the later stage of thermal cycling, the through-thickness microcracks...