

# 繊維学会西部支部外国人講演会



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場所：九州大学伊都キャンパス CE41 1F セミナー室

主催：繊維学会西部支部

## **Morphology and Mechanical Behavior of PEEK/PBI Blend**

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### **Abstract**

The mechanical behavior of polyetheretherketone/polybenzimidazole (PEEK/PBI) blend at 50:50 weight ratio under hygrothermal conditions has been investigated. Severe degradation of the PBI phase is observed when the blend is exposed to 288°C hot water environment. The interfacial bonding between PEEK and PBI is also found to change noticeably upon exposure to different hygrothermal conditions. Both PEEK and PBI possess functional groups that can form hydrogen bonding in the presence of water. The strength of the interface between PEEK and PBI under various hygrothermal conditions has been systematically studied by dynamic mechanical analysis and nanomechanical modulus mapping. In dry condition, the  $\tan \delta$  curve of PEEK in the PEEK/PBI blend is identical to that of neat PEEK. After water immersion, the  $T_g$  of the PEEK phase shifts to a lower temperature by 20 °C, and the extent of this shift is more pronounced than that observed from the soaked neat PEEK. The full-width half-maximum of the  $\tan \delta$  curve at  $T_g$  peak is slightly broadened. After water immersion, the sub- $T_g$  transitions that belong to PBI are clearly shown in PEEK/PBI. Nanomechanical modulus mapping results indicate that the relative elastic modulus in the interfacial region of PEEK/PBI is higher than both phases after water uptake. The observation strongly suggests the compatibility of PEEK and PBI is promoted by the formation of hydrogen bonding. Direct evidence of enhanced adhesion between PEEK and PBI after water immersion is demonstrated through the fracture study. The mechanisms that cause the property deterioration of the PEEK/PBI blend after hot water treatment are presented.

### **BIOGRAPHY OF THE SPEAKER**

Dr. H.-J. Sue is a Full Professor at the Department of Materials Science and Engineering, Texas A&M University. He received his Bachelor's degree in 1981 from Chung-Yuan Christian University. He then obtained his Masters' and Ph.D. degrees from University of Michigan in 1985, 1987, and 1988, respectively. Dr. Sue worked for Dow Chemical during 1988-1995. He has focused most of his research work on fundamental understanding of structure-property relationships of polymeric materials, polymer nanocomposites and scratch behavior of polymers and coatings. Dr. Sue is currently the Director of the Polymer Technology Center at Texas Experimental Engineering Station and a holder of Texas Engineering Experimental Station Professorship.

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