

高分子学会九州支部外国人研究者講演会

## New Strengthening Concept for Polymers and Composites

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総合教育研究棟 多目的ホール

米国のDepartment of Mechanical Engineering, Texas A&M UniversityのHung-Jue Sue教授は、高分子材料および複合材料の構造と物性、特に破壊挙動、スクラッチ（ひっかき）挙動、ナノ構造体の分散挙動に関する研究を精力的に行われている研究者です。今回は、最近明らかにされた複合材料の性能向上のための新しいアプローチに関する研究内容の講演をいただく予定です。奮ってご参加ください。

### Abstract

Significant academic and industrial efforts have been made in the past three decades to reinforce polymers and composites using nanoparticles, hoping that greatly improved physical and mechanical properties of the polymer matrix can be realized for demanding engineering applications. However, little success is known. One of the many difficulties is our inability to achieve consistently good dispersion of nanoparticles in polymer matrices. In some cases, even when good dispersion of nanoparticles is achieved, the level of improvements in physical and mechanical properties is disappointingly small. The above facts point to our lack of fundamental knowledge with regard to structure-property relationship of polymer nanocomposites. In this presentation, a new concept on utilizing well exfoliated hybrid nanoparticles to shield and delay defects from developing into critical size upon loading for greatly improved strength and toughness is presented. Examples of successfully prepared polymer nanocomposites that exhibit outstanding physical and mechanical properties will be demonstrated based on various types of nanoparticles and their hybrids. Fundamental principles for the preparation of polymer nanocomposites for engineering applications are outlined. Commercial significance of the present findings is also discussed.

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