



ME Seminar



The Role of Interfaces in Polymer Nanocomposites: Processing, Properties and Applications **Dr. Pankaj Tambe, School of Mechanical Engineering, VIT-AP University, Andhra Pradesh**

ABSTRACT

The demand for advanced materials with multifunctional properties requirements is increasing from aerospace, defense to space applications. In this regard, the nanocomposites materials with multifunctional properties having multiple fillers in micro/nano scale have caught the attention of researchers worldwide. The important aspect for achieving the desired properties as per applications requirements is to tailor the interface between the fillers and matrix of nanocomposite materials. For interface tailoring of nanocomposite materials, reinforcing filler materials are modified generally. In this presentation, the major emphasis will be the discussion of micro/nano scale reinforcing filler modification and its influence on the mechanical properties of polymer nanocomposites. With more than a decade of research experience in the area of polymer nanocomposites, the two topics discussed in detail will be the thermosets and thermoplastics based polymer nanocomposites. Thermoset based polymer nanocomposites discussion is centered on my research work applications in the aerospace industry. In specific, the multiscale nanocomposites and sandwich nanocomposites containing graphene will be discussed with a highlight on the role of interface, synthesized graphene utilization in the realization of application requirements in the aerospace industry. Thermoplastics based polymer nanocomposites are centered on my research work in polypropylene nanocomposite fibers and nanocomposites of thermoplastic polymer blends. In specific, the role of compatibilization, covalent and non-covalent modification of nanofillers in influencing the mechanical properties of nanocomposites will be discussed. Further, the implication of my research work of thermoplastics bends and its nanocomposites integration with additive manufacturing technology for the development of multifunctional nanocomposites for many potential applications will be highlighted as a scope of future work.

ABOUT THE SPEAKER

Dr. Pankaj Tambe received a Ph.D. degree in Metallurgical Engineering and Materials Science from the Indian Institute of Technology, Bombay, India in 2010. From 2010-2017, he was a faculty member of the School of Mechanical Engineering, VIT University, Vellore. At VIT University, Vellore, he had contributed to the development of the Composite Materials Lab and guided 6 Ph.D. students. Since May, 2017 to date, he is a faculty member of the School of Mechanical Engineering, VIT-AP University, Amaravati, Andhra Pradesh. Currently, he is guiding 7 students for their Ph.D. in the research area of polymer blends and their nanocomposites, 2D nanosheets based nanofluid stabilized using low molecular weight polymer for electronic chip cooling applications, and boron nitride bases aluminum matrix nanocomposites. His research interests are structure property correlations of nanocomposites, the science of interfaces in composite materials, and nanoscience for thermal management applications.



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