

Enhanced tribological performances of aligned carbon nanotube polymer nanocomposite

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Owing to their unique mechanical, thermal and electrical properties, carbon nano tubes (CNTs) have attracted extensive research attention worldwide since their discovery in 1991. CNTs have been envisioned as an ideal reinforcement in developing advanced structural including high wear resistant nano composites. However, up to now, most studies on the tribological properties of CNT reinforced polymer composites only showed modest improvement in the wear resistances, which is about two far from the expected level. In this study, a new continuously aligned carbon nanotube (ACNT) reinforced epoxy nano composites were fabricated by wetting as-grown arrays of ACNTs. High magnification scanning electron microscopy (SEM) observations confirmed the uniform distribution of ACNTs in the epoxy composites. Owing to its load-transfer-favored structure, ACNTs showed orders of magnitude higher improvement in the wear resistance of epoxy composite compared to randomly dispersed CNTs in epoxy reported before. Further, the experimental results also showed the wear performance of ACNT reinforced epoxy composites is highly dependent on the orientations of CNTs relative to the sliding direction. In particular, it was found that ACNTs achieved the highest improvement in wear resistance in normal direction whereas the least improvement was observed in parallel direction. Based on microscopic observations, new CNT related wear mechanisms were further proposed.

Biography

Li Chang received his Ph.D. in 2005 from the Institute for Composite Materials (IVW GmbH), Technical University of Kaiserslautern, Germany. He is a Lecturer at the University of Sydney. He has more than 50 publications, including 4 invited book chapters, 24 refereed journal papers, 22 referred conference proceedings papers and 1 patent.

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