강연1

Molecular Level Process for Carbon Nanotube Nanocomposites

Soon Hyung Hong*, Seung Il Cha, Kyung Tae Kim and Chan Bin Mo

Department of Materials Science and Engieering, Korea Advanced Institute of Science and Technology, 373-1 Kusung-dong, Yusung-gu, Daejeon 305-701, Korea
E-mail: shhong@kaist.ac.kr

Carbon nanotubes(CNTs) have been considered as ideal reinforcement for nanocomposites due to their high modulus and strength. However, the performance of CNT reinforced metal or ceramic nanocomposites fabricated conventional powder metallurgy process or infiltration process is below the expectation owing to agglomeration of CNTs and poor interfacial strength. In this study, CNT reinforced metal and ceramic nanocomposites with homogeneously distributed CNTs with strong interfacial strength are fabricated by a novel fabrication process, i.e. molecular level process. The physical properties of CNT/Cu and CNT/Alumina nanocomposites are characterized. The molecular level process for CNT embedded metal or ceramic nanocomposite powders consists of several steps including chemical activation of CNTs, dispersion of CNTs, mixing of metal ion with activated CNT, calcinations and reduction processes. The fabricated nanocomposite powders are consolidated by spark plasma sintering. In case of CNT/Cu nanocomposites, the strength increased by 2.5 times compared to matrix and the elastic modulus increases by 1.5 times compared to those of Cu. In case of CNT /Alumina nanocomposites, both hardness and fracture toughness increased by 15% compared to those of alumina. The CNTs are verified as the most promising reinforcement for metals and ceramics, when they have strong interface and homogeneously distributed in matrix.