

Carbon Nano-Powder Functionalization and Disperisibility with Plasma Discharge

강유석, 정만기, 이덕연, 송석균, 김성인

철원플라즈마산업기술연구원

A novel plasma system has been developed for 3-dimensional modification of the carbon nano-powders. Improvement of dispersion of these nano materials are studied by plasma discharge, not using chemical modification. The plasma process is considered to great advantages over wet chemical process due to environmental, economic viewpoint, and uniformity over the treated volume. The uniform dispersion is a critical factor for these material's nano composite applications. Using this plasma system, graphene, carbon black, and CNT was treated and functionalized. Several key discharge conditions such as Ar/H₂/O₂ or Ar/H₂/NH₃ gas ratio, treatment time, power, feeder's vibration frequency are investigated. Hydrophobic of graphene has turned some more into hydrophilic by reaction test with water, electrophoresis, surface contact angle test, and turbidity analysis. The oxygen content ratio in the plasma treated CNT has increased about 3.7 times than the untreatedone. In the case of graphene and carbon black, the oxygen- and nitrogen- content has been enhanced average 10%. O-H (N-H) peak, C-O (C-N) peak, and C=O (C=N) peak data have been detected by FTIR measurement and intensified compared to before-plasma treatment due to O₂ or NH₃ content.

Keywords: Plasma discharge, Graphene, CNT, Carbon black, Functionalization, Dispersion