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Improved Purification and Dissolution Properties of Carbon Nanotubes by Irradiation of Accelerated Particles. EBRAHIM NAJAFI, CHONGOH LEE, KWANWOO SHIN, Gwangju Institute of Science and Technology, S. J. NOH COLLABORATION, K.R. KIM COLLABORATION, B.C. LEE COLLABORATION — Carbon nanotubes (CNTs) have recently attracted much interest for their exceptional chemical and physical properties and unique aspect ratio. Yet, CNTs applications have been somewhat limited due to their retained impurities and limited solubility in most organic solvents. In this work, we study the feasibility of using accelerated particles (electrons and protons) to covalently modify CNT surface. Results show that accelerated proton radiation with a energy of 10 MeV, both in an ambient atmospheric condition, can generate oxygen-rich functional groups, e.g. carboxylic acid and phenol, on CNTs surfaces and significantly improve their solubility without any significant surface damage. On the other hand, accelerated electron beam induced effective removal of SP^3 carbon bonding, resulting that physical welding of crossed carbon nanotubes. This work is supported by the Proton Accelerator (No. M202AK010021-04A1101-02110) and Accelerated Electron User Program from the Nuclear R&D Program.

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