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Investigation of electron beam irradiation effect of carbon nanotubes on Ni coated Si (100) substrate by microwave plasma-enhanced chemical vapor deposition

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We have investigated electron beam irradiation effect of carbon nanotubes by scanning electron microscopy, transmission electron microscopy, photoemission electron microscopy, and near-edge-x-ray-adsorption-fine-structure. The carbon nanotubes were synthesized on the Ni coated Si (100) substrate using microwave plasma-enhanced chemical vapor deposition at 650°C with gas mixture of CH₄ and H₂ of ratio 1:8. Through the photoemission electron microscopy, we found out a change of contrast, electron beam irradiated region was brighter than unirradiated region. From near-edge-x-ray-adsorption-fine-structure, there are C-H σ^* in as-grown carbon nanotubes but C-H σ^* decreased after electron beam irradiating. These results show that hydrogen was dissociated from C-H bond by electron beam irradiation.