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'Sliding Kinetics' of Carbon Nanotubes on Self-Assembled Monolayer Patterns JIWOON IM, MINBAEK LEE, SUNG MYUNG, JUWAN KANG, DONG JOON LEE, SEUNGHUN HONG[1], School of Physics and Astronomy, Seoul National University — Recently, self-assembled monolayer (SAM) patterns were utilized to guide the 'assembly' and 'alignment' of single wall carbon nanotubes (swCNT) on solid substrates for the large scale fabrication of swCNT-based devices (Nature 425, 36 (2003); Nature Nanotechnology 1, 66 (2006)). Herein, we present the experimental results and theoretical model describing the new adsorption kinetics of swCNTs onto SAM patterns including the 'sliding motion' of swCNTs. The adsorption behavior of swCNTs on large-size SAM patterns is similar to Langmuir isotherm, while that on the nano-scale patterns shows a significant deviation which can be explained by the 'sliding motion' of adsorbed nanotubes (J. of Chem. Phys. 124, 224707 (2006)). The 'sliding chamber' experiment confirms that swCNTs can align along the SAM patterns by sliding motion right above the SAM surfaces. We performed extensive study regarding the adsorption behaviors of swCNT on various SAM patterns as well as the solvent effect on CNT adsorption. These results could provide important guidelines for large-scale directed assembly of swCNT-based devices in the near future.

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