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An ex-situ method to convert vertically aligned carbon nanotubes array to horizontally aligned carbon nanotubes mat

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Abstract

Carbon nanotubes (CNTs) have been attracted by the researchers for their extraordinary properties and wide applications in various fields. Among numerous types of CNTs, the horizontally aligned CNTs (HACNTs) has shown many advantages due to its nano-structural features and proper arrangements. HACNTs open new opportunity in the field of microwave, nanoelectronics, and heat dissipation system. This article reports the study on the post-growth processing technique (mechanical) to transform vertically aligned carbon nanotubes (VACNTs) array into HACNTs mat. The above technique has been named as micromechanical rolling (M2R) that uses a rotating rigid cylinder to bend and align the individual nanotubes in the VACNTs array. The process yielded remarkably arranged (horizontal) nanotubes with a resultant smooth surface. Various process parameters such as tool rotational speed, lateral speed, and step size were investigated in this study to achieve the smooth surface of HACNTs array. It was observed that the minimum surface roughness of Ra = 4 nm was achieved with 2000 rpm of the tool's rotational speed, 1 mm min⁻¹ of lateral speed and 1 μm of step size.

Keywords

Author Keywords: [carbon nanotube mat](#); [carbon nanotube](#); [horizontally aligned carbon nanotubes](#); [CNTs](#); [micromechanical rolling](#)

KeyWords Plus: [DENSIFICATION PROCESS](#); [GROWTH](#); [ELECTRODES](#); [MECHANISMS](#); [DIAMETER](#); [FORESTS](#)

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