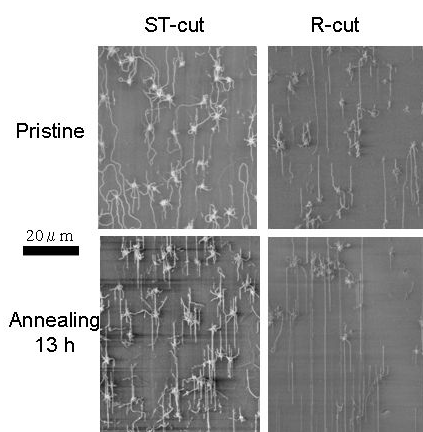
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Proof**CONTROL ID:** 873599**PRESENTATION TYPE:** Contributed Paper : Poster**SUBJECT AREA:** (9) Materials & Nanotechnology**SYMPOSIUM:** (135) Carbon Nanotubes and Nano-Carbon Materials: Preparation, Characterization, and Applications**Presenter Details****PRESENTER PERSON INFORMATION:** Taiki Inoue, 7-3-1 Hongo, Bunkyo-ku, Tokyo, Japan, 113-8656**PRESENTER (E-MAIL ONLY):** inoue@photon.t.u-tokyo.ac.jp**Abstract****TITLE:** Horizontally Alignment Mechanism of SWNT Growth on R-cut Crystal Quartz Substrates**AUTHORS (LAST NAME, FIRST NAME):** Inoue, Taiki¹; Okabe, Hiroto¹; Chiashi, Shohei¹; Shiomi, Junichiro¹; Maruyama, Shigeo¹**INSTITUTIONS (ALL):** 1. Department of Mechanical Engineering, The University of Tokyo, Tokyo, Japan.

ABSTRACT BODY: Orientation control of SWNTs is important for various device applications. Horizontally aligned SWNTs can be synthesized on specific substrates, such as sapphire and crystal quartz substrates, and ST-cut substrates are popularly used in the case of crystal quartz substrates. On ST-cut surfaces, SWNTs are grown along the direction of the x-axis, and the orientation is improved after annealing at high temperature for an extended time. The orientational growth mechanism is explained by the atomic structure of the ST-cut surface, which is too complicated because ST-cut surface is not the natural surface of crystal quartz. In this paper, we used R-cut ($\{101\}$ face) substrates of crystal quartz for improved horizontally aligned growth of SWNTs. The $\{101\}$ face is one of the stable surfaces that appear on natural quartz crystal, and it is closest to the structure of the ST-cut surface. Fe/Co metal nanoparticles supported on zeolite particles were used as catalyst. The zeolite particles were dispersed on the R-cut surface and SWNTs were synthesized by the alcohol catalytic CVD method. SEM and AFM observations revealed that SWNTs were grown along the direction of the x-axis on the R-cut surface without annealing treatment. On the R-cut surface, step and terrace structures appeared in AFM images. SWNTs were aligned within the terraced area, indicating that the surface atomic structure determine the alignment. We conclude that the ST-cut surface is a collective of small domains of $\{101\}$ faces and the resulting alignment of SWNTs is owing to the $\{101\}$ face structure.



SEM images of SWNTs on pristine and annealed ST and R-cut crystal quartz substrates.

(No Table Selected)

Abstract Details

Student Poster Competition: Yes, if accepted in Review Round 1, I will present my poster at the regular session and at the Student Poster Competition.

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Invited Paper :

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