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Energy accommodation of gas molecules with free-standing vertically aligned single-walled carbon nanotube arrays IKUYA KINEFUCHI, KIZEN RYU, KEI ISHIKAWA, JUNICHIRO SHIOMI, SHU TAKAGI, SHIGEO MARUYAMA, YOICHIRO MATSUMOTO, The University of Tokyo — The scattering process of gas molecules on vertically aligned single-walled carbon nanotubes (VA-SWNTs) was investigated by molecular beam technique. The measurement was performed for the free-standing samples, which enabled us to evaluate the scattering process of gas molecules on VA-SWNT films themselves in detail without the presence of substrates. The scattered molecules are divided into three components: reflected molecules, diffusively transmitted molecules, and directly transmitted molecules without interaction with SWNTs. Even for the film as thin as 0.1 μm, the incident molecules are found to be well accommodated to the surface temperature. This result suggests that, regardless of film thickness, most molecules have enough number of collisions with SWNTs for efficient energy transfer at the randomly oriented layer at the topmost of the films.

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