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标题: Diameter Dependence of Sub-Terahertz AC Response of Metallic Carbon Nanotubes with a Single Atomic Vacancy
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摘要: The sub-THz AC response of metallic single-walled carbon nanotubes (M-SWNTs) with a single atomic vacancy is investigated theoretically focusing on its diameter dependence. We find that the AC response behaves more capacitively in large-diameter M-SWNTs with a vacancy at the center of the SWNT in contrast to the diameter-independent AC response of a pristine M-SWNT showing the inductive response. This can be understood from the fact that the large-diameter M-SWNTs with a vacancy have more scattering states for electrons around the vacancy than the small-diameter ones. In addition, the threshold of vacancy position from the center of the SWNT, beyond which the inductive response appears regardless of the Fermi level position, is higher for large-diameter M-SWNTs than for small-diameter ones. Moreover, we find that the AC response depends strongly on tube diameter, but not on the type of tube, i.e., armchair or zigzag. (C) 2012 The Japan Society of Applied Physics
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