

Abstract Submitted
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Electronic state of carbon material surface by non-contact scanning nonlinear dielectric microscopy SHIN-ICHIRO KOBAYASHI, YASUO CHO, Research Institute of Electrical Communication, Tohoku University — Non-contact scanning nonlinear dielectric microscopy (NC-SNDM) can detect both topography and microscopic electric dipole moment of semiconducting surfaces. Recently, we clearly observed the atomic surface of graphite and fullerene (C_{60}) molecule on Si(111)-(7×7) surface (7×7 surface) by using second-order amplitude in SNDM signal as a feedback signal. SNDM signal of graphite by NC-SNDM originates from the electrochemical capacitance with tunneling and is related to the density of state (DOS) of an atomic or molecular surface [1,2]. However, a linear DOS was considered to investigate the origin of SNDM signals only when considering the electronic state of graphite surface, interface between C_{60} and 7×7 surface and internal structure of C_{60} on 7×7 surface in NC-SNDM. To resolve this problem, we introduce the general electrochemical capacitance induced by tunneling effect for analysis of NC-SNDM and discuss not only the influence of probe tip on SNDM signal and the origin of current signal but also the characteristics of SNDM signals obtained from graphite and from C_{60} on 7×7 surface

[1] S. Kobayashi and Y. Cho, Phys. Rev. B, 82, 245427(2010).

[2] S. Kobayashi and Y. Cho, Surf. Sci., 606, 174(2011).

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