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Kiminori Sato

Tokyo Gakugei University, Japan

Functional two-dinensional materials for energy and environment

Two-dimensional (2D) nanomaterials, as e.g., inorganic layered mineral, graphene, and metallic nanosheet, have been attracting increasing interest in the field of energy- and environment-related advanced materials owing to their unique properties on catalysis, adsorption, and electronic transport. It is known that the inorganic layered nanoparticles spontaneously organize into well-defined local structures through the mutual interactions of 2D nanosheets in the presence of water molecules. This spontaneous ordering of 2D nanosheets induced by water molecules, so-called self-assembly of 2D nanosheets, is found to produce the local molecular structures that is responsible for environmental functionalities Here, local molecular and electronic structures created by 2D nanosheets are explored for the purpose of enviromental application, as e.g., an improvement of Cs specific adsorption, enhancement of CO_2 adsorption, appearance of proton conductivity, and so on. The open spaces formed by 2D nanosheets with the sizes ranging from Ångstrom to nanometer are highlighted on the basis of the results of element-specific positron annihilation spectroscopy togther with molecular dynamic (MD) simulation.

Biography

Kiminori Sato has completed his PhD at Department of Applied Physics, The University of Tokyo and then Postdoctoral Studies at Institut für Theoretische und Angewandte Physik, Universität Stuttgart, Department of Physics, Washington State University, and National Institute of Advanced Industrial Science and Technology (AIST). He is now an Associate Professor of Department of Environmental Sciences, Tokyo Gakugei Univeristy.

sato-k@u-gakugei.ac.jp

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