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Solvothermal synthesis of graphene, carbon-based nanoparticles, characterization, study their properties and applications

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Recent progress in syntheses and characterizations of nano-sized materials are in their high stages, actively facilitating new and up-to date developments of equipment and technique for manufacturing and precision process. Our work presents synthesis of graphene, carbon-like and other metallic nanomaterials by solvothermal synthesis method. Synthesis carried out inside stainless steel autoclave, with applying of temperature from 1-300 °C, and pressure between 1 and 20 Mpa. XRD analyses, TEM, HRTEM observations, FT-IR, Raman spectoscopical characterizations were used to determine phase, composition, and size parameters of as-synthesized nanomaterials. Variable synthesis conditions (T/°C, pressure/MPa, time/hours, days), and types of starting materials (initial compound, solvent liquid, and surfactant) allow us to achieve unique phase and structure nanomaterials. Currently, graphene-like compound by solvothermal synthesis was synthesized and analyzed by HRTEM which revealed several-layer graphene sheets with hexagonal comb structure. Raman spectra collected at the room temperature, using the He-Ne laser (633 nm), from 100 to 3000 cm-1 of Raman shift, detected second ordered 2D band at around 2700 cm-1. In addition, influence of various surfactants to the solvothermal synthesis process of graphene-like nanomaterials is studied and currently analyzing to find the optimal and appropriate synthesis conditions.

Biography

Zhypargul Abdullaeva is Assistant Professor in the Department of Materials Science and Engineering at Kumamoto University in Japan. She has graduated her PhD degree from the Kumamoto University in Japan. Her research is focused on syntheses of carbon, graphene nanomaterials and their characterizations, and study of their properties, including biomedical, cancer treatment, photocatalytical, optical, applications, etc. She has authored number of scientific publications and has received Gold, Silver and Bronze diploma awards in the Chemistry Olympiads. She is also a member of the Japanese Ceramics Society, American Vacuum Society, and Materials Research Society, European Society of Biomaterials.

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