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Development of Nano-sized graphene material for neutron intensity enhancement below cold neutrons

Slow neutrons, such as cold neutrons, are really important non-destructive probes not only for basic physics but also for the structural genomics advancements. Neutron-based science is also known as high-neutron-intensity-dependent science. A new unique method focusing on nanosized particle aggregation has been proposed to increase neutron intensity below cold neutron energy region. The method is based on intensity enhancement by multiple coherent scatterings with nanosized particle aggregation. The aggregation of nanosized particles matches the wavelength of below cold neutrons, causing a similar effect to coherent scattering, so-called Bragg scattering, leading to neutron intensity enhancement by several orders of magnitude. Nanodiamonds and magnesium hydride have recently been studied numerically and experimentally. The major challenge with nanodiamonds in practical applications is the molding method. Another carbon structure, graphene is focused on to find a solution to this problem.
In this paper, we report the potential of nanosized graphene as a reflector material below cold neutrons, together with recent experimental results.

Primary author: Dr TESHIGAWARA, Makoto (Japan Atomic Energy Agency)

Co-authors: Dr IKEDA, Yujiro (RIKEN); Dr MURAMATSU, Kazuo (INCUBATION ALLIANCE INC.); SUTANI, Koichi (INCUBATION ALLIANCE INC.); Dr FUKUZUMI, Masafumi (Hyogo Prefectural Institute of Technology); Dr NODA, Yohei (Ibaraki University); Prof. KOIZUMI, Satoshi (Ibaraki University); Dr SARUTA, Koichi (Japan Atomic Energy Agency); Dr OTAKE, Yoshie (RIKEN)

Presenters: Dr TESHIGAWARA, Makoto (Japan Atomic Energy Agency); Dr MURAMATSU, Kazuo (INCUBATION ALLIANCE INC.)

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