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Chemistry of graphene oxide toward application for composite functional materials

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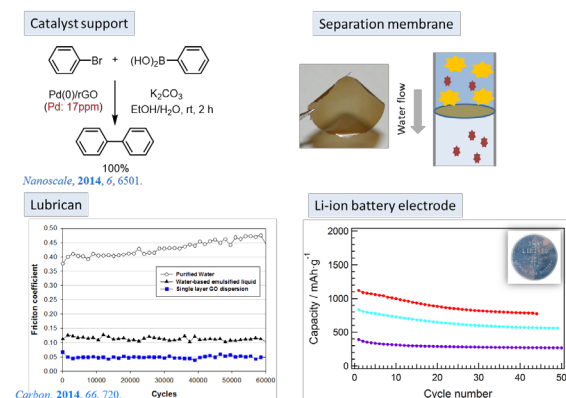
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Graphene oxide (GO) has widely been employed in various fields, but its structure and composition has still not been fully controlled. Based on the formation mechanism of GO, we have developed general strategies to control the oxidation degree of graphene-like materials with two types of methods: oxidation of graphite by KMnO_4 in H_2SO_4 (o-GO) and reduction of highly oxidized graphene oxide by hydrazine (r-GO). Even though the oxygen content was the same, o-GO and r-GO showed different properties in adsorption ability, oxidation ability, and electron conductivity, because of the difference in persisting graphitic structure and defects. These results will be a guideline for production of tailor-made GO.



Applications such as conductive films, electrodes for lithium-ion batteries, super-capacitors and catalysts often require surface functionalization's to improve GO's performances. Recently, adsorbents and membranes for water purification have also been recognized as promising applications of graphene-like materials. With our tailor-made GO, we developed catalyst, membrane, lubricant additive and anode for Li-ion battery.

Our Successful Results



Biography

Yuta Nishina is an Associate Professor at Okayama University, Japan. He started his research on organic chemistry at Okayama University. During his PhD course, he joined the research groups in MIT and Kobe University. He obtained PhD in 2010 and started his academic career as Assistant Professor at Okayama University and was promoted to Associate Professor in 2014. In 2012, he started using nano-carbons, especially graphene oxide, from a view point of organic chemistry. He is involved in projects toward industrial production and practical application of graphene oxide and its composite materials. He established his venture company (Ni-Si-Na Materials, Co. Ltd.) in 2012 to distribute graphene oxide for practical application.

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