Organic Molecules-mediated Pore Structure Control of Graphene Monoliths

Austina Dwi Putri[1], Ryusuke Futamura[1], Toshio Sakai[2], Katsumi Kaneko[1]

[1]Center for Energy and Environmental Science, Shinshu University, Nagano, Japan
[2]Faculty of Engineering, Shinshu University, Nagano, Japan

Development of functionalized carbon materials having tuned pore structure and morphology has been highly requested for various applications. It is reported that KOH-activated graphene monolith of a unidirectional texture structure had a large surface area and could create a wide range of pores, poses a hierarchical pore structure from micropores to mesopores[1,2]. However, controlling the pore structure is crucial to promote their potential application such as adsorbents for target molecules and ions and highly functionalized electrodes[3].

Selective intercalation of organic molecules between graphene oxides is reported.[4] Thereby it is expected to vary the aggregation state of graphene oxide in water. Various organic molecules (methanol and ethanol) were added to the graphene-oxide colloidal solution before the unidirectional freeze-drying method. A partial segregation of graphene oxide colloids due to selective adsorption of organic molecules on graphene oxide leads to enhance restacking of graphene oxides to decrease mesoporosity on the course of production of nanoporous graphene monoliths. The presence of different alkyl moiety gives a various effect of suppressing the mesoporosity.

References

1) S. Wang, F. Tristan, D. Minami, T. Fujimori, R. Cruz-Silva, M. Terrones, K. Kaneko, et al. *Carbon.* **2014**, 76, 220-231.
2) S. Wang, A. Morelos- Gómez, Z. Lei, K. Takeuchi, W. Terrones, K. Sugimoto, M.Endo, K. Kaneko, *Carbon*, **2016**, 96,174-183
3) T. J. Bandosz, S. Wang, D. Minami, K. Kaneko, *Carbon*, **2015,** 87, 87-97.
4) S. You, J. Yu, B. Sundqvist, N.V. Avramenko, M.V. Korobov, et al., *J Phys Chem C,* **2013**, 4, 1963–1968.