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Investigation of Plasma Functionalization onto Multi-walled Carbon Nanotubes for the Enhancement of Mechanical Properties of Polyurethane DAISUKE OGAWA, HIDEO UCHIDA, KEIJI NAKAMURA, Chubu University — Functionalization is a crucial process to overcome a barrier of the application with carbon nanotubes (CNTs). A standard method to functionalize CNTs is to attach carboxyl groups (R-COOH) with nitric acid. In addition to the method, plasma processing can also functionalize CNTs. This presentation shows investigation on the functionalization with the plasma generated with a gas mixture of nitrogen and carbon dioxide to aim an enhancement of mechanical property of polyurethane. According to previous experimental results, the plasma-treated CNTs can enhance the wear-resistance of polyurethane by using them as a composite material. In order to identify the mechanism of the enhancement, an organic dye, acridine yellow G, is applied to the plasma-treated CNTs. The fluorescent measurement showed the indication of isocyanate groups on CNTs. Also, the measurement revealed that the fluorescence was from the location where there was no CNTs coagulation found with the observation of an optical microscope. This result recommended size selection with centrifugation onto plasma-processed CNTs. Then another fluorescent measurement showed that the plasma preferentially functionalizes smaller CNTs.

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