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Investigation of Wear-resistant Enhancement of Polyurethane Composite Film with Plasma-treated Carbon-nanotubes DAISUKE OGAWA, None, KAZUKI MICHIYA, HIDEO UCHIDA, KEIJI NAKAMURA, Chubu University — Our former results showed that the plasma-treated CNTs enhanced the wear-resistance of polyurethane (PU) by means of making a CNT composite film. In particular, a treatment with the plasma made from a gas mixture of nitrogen and carbon dioxide was the most effective to enhance the wear-resistance. We have not understood the mechanism of the enhancement yet, but speculating two possibilities for the enhancement. The first possibility is due to a physical effect, in which the plasma treatment somehow enhances more uniform and more monosized distribution of CNTs in a PU film. The second possibility is due to a chemical effect. According to the discharge condition, nitrogen, carbon and oxygen species in the plasma can create isocyanate groups (R-NCO) on the CNTs. In fact, isocyanate groups can harden PU through chemical reactions. In order to find the main cause of the enhancement, we first observed the film with an optical microscope. However, the observation showed that the distribution of CNTs treated with the plasma was almost the same as that of other CNTs. On the other hand, the other investigation with acridine yellow, which is an indicator of the isocyanate groups through fluorescence, showed more isocyanate groups on the CNTs treated with the plasma.

Daisuke Ogawa
None

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