# Intercalation Technology for Preparing a Mica—Organic Hybrid Solid Lubricant and Spectroscopic Evaluation of Its Lubrication Mechanism

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**Abstract**

The lubrication behavior of mica–alkyl ammonium cation hybrid solid lubricants fabricated via an intercalation reaction was evaluated by reciprocating sliding tests, and the lubrication mechanism was investigated from the viewpoint of interlayer adhesion strength by Fourier-transform infrared spectroscopy (FTIR) and X-ray photoelectron spectroscopy (XPS). Evaluation of hybrid micas with three alkyl ammonium cations, which have different lengths and numbers of alkyl chains, indicated that the friction coefficient decreased from 0.4–0.5 to a minimum of 0.12 with increase in the length and the number of alkyl chains of the organic cations. The results of X-ray diffraction revealed that the intercalated organic cations increase the *d*-spacing of mica, and the effect became prominent with increase in the length and the number of alkyl chains. The results of FTIR and XPS analyses indicated that the interlayer adhesion strength of mica is weakened with increase in the *d*-spacing, which correlated well with the results of friction coefficient.

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