

Abstract Submitted
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Tribological properties of bound plus mobile lubricants for MEMS application.¹ BRENDAN MILLER, D. ADAM HOOK, JACQUELINE KRIM, North Carolina State University, AFOSR MURI EXTREME FRICTION TEAM — Long chain alkylsilane monolayers are used to protect MEMS devices from adhesion due to contamination. One such monolayer, perfluorodecyltrichlorosilane (PFTS) has been shown to have very advantageous thermal properties but will wear under mechanical rubbing. The mobility of vapor phase lubricants (VPL) used in conjunction with these self-assembled monolayers (SAMS) [1] may be the key to extending the lifetime of rubbing contacts in MEMS by replenishing worn away parts of the SAM. We studied tricresyl phosphate, a known anti-oxidant, and Nye lubricant, used for aerospace applications. We measured friction and obtained wear characteristics with a quartz crystal microbalance (QCM), a sliding tribometer under cryogenic temperatures, and an AFM in order to understand the effect of mobility, temperature, and atomic-point contacts to help bridge the gap between fundamental friction and MEMS application.

[1] “Dynamics of Vapor-Phase Organophosphates on Silicon and OTS W. Neeyakorn¹, M. Varma¹, C. Jaye¹, J. E. Burnette, S.M. Lee, R. J. Nemanich, C. Grant² and J. Krim” Tribology Letters, in press.

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