



INSTITUTE COLLOQUIUM
INDIAN INSTITUTE OF SCIENCE

Prof. S.K. Biswas

Department of Mechanical Engineering

will deliver a lecture

on

**Mechanical response of mono-molecular layers self
assembled on solid surfaces**

**on Tuesday, 14th September 2004
at 4.00 p.m. in the Faculty Hall**

THE DIRECTOR
will preside.

All are cordially invited

Coffee/Tea: 5.00 p.m.
Venue: Reception Hall

ABSTRACT

Some short chain organic molecules self assemble on solid surfaces exhibiting long range order. The conformation of these molecules undergo profound changes when subject to mechanical forces and thermal perturbations. We study the correlation of mechanical properties of these self assembled monolayers with conformational and distortional changes introduced in these monolayers. In this talk I shall present the description of a contact force apparatus we have developed for studies of static and dynamic mechanical properties of molecular layers and present data of changes in damping and load bearing stiffness of perfluorosilane self assembled on polycrystalline aluminium as a function of mechanical loading. In the second part of the talk we will estimate the adhesion of surfaces in an aqueous medium as we change the work of adhesion of a surface layer in free space by changing the conformational order of molecules assembled on the surface. We do the latter by changing chain length and heat treatment of the monolayers. The adhesion is generated in an atomic force microscopic contact. The talk will perhaps raise more questions than give answers as we point out the speculative nature of our understanding of the genesis of adhesion in aqueous medium and the inadequacy of macroscopic-thermodynamic properties to address the mechanics of adhesion at small length scales.