



**TIFR Centre for Interdisciplinary Sciences,
Narsingi, Hyderabad 500075**

Seminar

Exotic cracks

Joel Marthelot

TCIS, Hyderabad

Nanometer to micrometer thin film coatings are extensively used in material science to protect and functionalize surfaces. Coating processes however generally result into residual strains and may induce the propagation of cracks with dramatic consequences on film reliability. Such cracks result into the disordered network pattern observed in china crockery, old paintings or dry mud, and bear analogies with plant leaves venation or urban networks.

We found that classical criteria fail to predict the stability of thin films in the case of moderate adhesion. Moreover intriguing cracks of regular geometry are found to self-replicate an initial triggering pattern independently from the local material properties. We describe the fracture mechanism with universal energy arguments and provide a simple model describing the crack path. We show that the extreme robustness of the peeled pattern can turn fracture into a design tool, opening potential applications to micro-tailoring.

Friday, Apr 4th 2014

04:00 PM (Tea/Coffee at 03:30 PM)

Seminar Hall, TCIS