Abstract Submitted
for the MAR09 Meeting of
The American Physical Society

Adhesion Enhancement by Interfacial Microcrack Toughening YUE QI, GM R&D Center, HAIBO GUO, University of South Carolina, XINGCHENG XIAO, GM R&D Center, ZHIHUI XU, XIAODONG LI, University of South Carolina — In this study, we reported a novel approach to enhance the adhesion of diamond coatings on titanium substrate by interfacial toughening. An array of oriented and confined micro-cracks around the interface was found to have the ability of opening and self-healing to release strain energy, by which to enhance macro-adhesion. Density functional theory calculations explained that cracks are energetically preferred to initiate and propagate along the (100) plane in titanium carbide interlayer. Thus by controlling the orientation of the interlayer for the failure associated with the delaminatation can be avoided for the coating/interlayer/substrate system.

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Date submitted: 25 Nov 2008 Electronic form version 1.4