Contribution ID: **204** Type: **Poster Presentation**

Use of raman spectroscopy to study fatigue type processes in polycrystalline diamond (PCD)

Wednesday, 13 July 2011 17:00 (2 hours)

<p>Polycrystalline diamond (PCD) cylindrical cutters used in oil well drilling are susceptible to fracture due to the hostile environment of randomly occurring high impact loads. These cutters commonly consist of a PCD layer sintered onto a cobalt-tungsten carbide (Co-WC) substrate. The fact that the cutters fail after repeated use gives rise to the possibility of fatigue type processes in diamond. The study of stress fields and their relative geometries thus become crucial in the quest to have extended lives for these cutters. Since the diamond Raman line reveals both the nature and magnitude of the stress present in the material this technique was employed in this work. Room temperature measurements show a general compressive stress field on the PCD before being fatigued using a ball on three balls test rig and it then gradually deteriorates to a residual tensile stress field. Whereas a general compressive stress is desirable in the PCD layer as it inhibits the propagation of cracks, on the contrary tensile stresses facilitate formation of cracks leading to catastrophic failure of the cutters.

Level (Hons, MSc,
   PhD, other)?

MSc

Consider for a student
   award (Yes / No)?

Yes

Would you like to <br> submit a short paper <br> for the Conference
 Proceedings (Yes / No)?

NO

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Session Classification: Poster1

Track Classification: Track A - Condensed Matter Physics and Material Science