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Assessing the effect of SiNx coating on CoCrMo and Ti6Al4V trunnions to mitigate fretting corrosion at the modular taper junction of hip prostheses

Wear and corrosion at the modular taper interface of hip prostheses is a significant contributor to early implant failure. The emanation of metallic ions and wear particles from the modular taper interface into the peri-prosthetic tissue of the hip often leads to various adverse local tissue reactions (ALTR). Therefore the application of a bio-compatible SiNx coating onto the trunnion of CoCrMo and Ti6Al4V alloy is currently being studied as a means of mitigating fretting corrosion at the modular taper interface. The purpose of this study was to assess fretting corrosion current emanating from a coated trunnion in comparison to an uncoated trunnion of a head-neck modular taper interface; both couples were subjected to varied cyclic loads. The results showed a significant reduction in fretting corrosion current for the modular taper interface where SiNx coating was applied unto the trunnion (see figure 1.)

Recent Publications:

1. Oladokun A et al (2017) The effect of cyclic load on the evolution of fretting current at the interface of Metal-on-Metal and Ceramic-on-Metal taper junction of hip prostheses. Bone Joint J. 99, no. SUPP 5: 68-68.
2. Bryant M G et al (2017) Surface and subsurface changes as a result of tribocorrosion at the stem-neck interface of bi-modular prosthesis. Biotribology. 10: 1-16.
3. Oladokun A et al (2016) Sub-surface investigation of fretted CO28CR6MO and TI6AL4V alloys. Bone Joint J. 98, no. SUPP 9: 99-99.
4. A Oladokun et al (2015) Fretting of CoCrMo and Ti6Al4V alloys in modular prostheses, Tribology - Materials, Surfaces & Interfaces. 9 (4): 165-173.

Biography

Abimbola Oladokun obtained a Bachelor's degree in Aerospace Engineering from the University of Leeds. He has almost completed a PhD degree, also at Leeds. His research is based on Biotribocorrosion of hip prostheses with specific focus on fretting corrosion of modular taper interfaces. He has experience working with coatings, surface characterization and assessing metallurgical transformations.

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