

Surface Texture of Bioimplants

Background

Artificial joint replacement is regarded as one of the most important operations in the past decades, which helps patients relieve pain and restore daily life. Nowadays, the general lifespan of a commercial product is approximately 15 years, which is short for the demand of potential consumers. This short in-vivo longevity is highly attributed to the aseptic loosening, induced by the wear particles.

Industrial demands

Considering the ageing population as well as the demand of younger population, 15 years' in-vivo service time generally means the requirement of second replacement operation for some patients. The need for a device lasting longer is urgent for both industry and patients.

New approach

Surface texturing can be an effective approach to improve the tribological performance of a bearing couple. The specially-designed micro patterns could help increase the longevity of bioimplants by trapping wear particles and increasing the thickness of lubricant film.

Progress and results

FDM model, based on the Reynolds equation, has been built to analyse the functionality of hydrodynamic pressure on the textured bioimplants. Meanwhile, a novel working mechanism of texture pattern is under investigation. Groove pattern and dimple has already been tested using pin-on-disk tribometer, which shows a huge improvement in tribological performance.

