

Poster-Session

Frictional properties, adhesion and hardness of commercially available coated knee implants

Maria Herbster¹, Joachim Döring², Jiri Nohava³, Christoph H. Lohmann², Thorsten Halle¹, Jessica Bertrand²

¹Institute of Materials and Joining Technology, Otto-von-Guericke University, Magdeburg, Germany; ²Department of Orthopaedic Surgery, Otto-von-Guericke University, Magdeburg, Germany; ³Anton Paar TriTec SA, Corcelles, Switzerland

jiri.nohava@anton-paar.com

Total knee replacement together with the total hip joint replacement is one of the most common arthroplasties. Most knee implants are based of CoCrMo or Ti₆Al₄V alloys, however, some patients are intolerant to Co or Cr ions that can be released from the bare metal. Implant manufacturers are therefore coating the implants with Ni-, Zr- or Nb-based protective layers. Such ceramic coating should prevent the ion release while having similar frictional properties as the uncoated metal. The coatings shall also have excellent adhesion so that they do not peel off of the metallic substrate. These two properties have therefore to be investigated in order to develop the most durable implant protective coating. In this study we present measurements of coefficient of friction in real-life mimicking conditions that showed that the coated implants have similar or better frictional properties compared to the uncoated implants. Adhesion tests of the coatings revealed differences between the coatings but in general confirmed their good adhesion. Since very few studies are available on this topic, we hope to contribute with our research to the development of more durable protective implant coatings.