Synthetic hydroxyapatite surface – a perfect dental enamel imitator?

Johanna Dudek[1], Thomas Faidt[2], Karin Jacobs[2], Matthias Hannig[1]

[1]Clinic of Operative Dentistry, Periodontology and Preventive Dentistry, University Hospital, Saarland University, Homburg/Saar and [2]Experimental Physics, Saarland University, Saarbrücken, Germany

In contact with saliva, intraorally exposed surfaces are covered within seconds by a layer of adsorbed salivary biomolecules. This initial acellular biofilm is composed of proteins, carbohydrates and lipids and it modulates tooth protection against erosive and abrasive challenges. In the course of time, planktonic microorganisms attach directly to the initial biofilm leading to the formation of a dental bacterial biofilm. Mature bacterial biofilms are highly complex ecosystems comprising up to several hundred different microbial species. They may cause caries, which is characterized by local demineralization of dental hard tissues, initially the enamel. Dental enamel consists of around 96 % hydroxyapatite (HAP). The exact chemical composition of dental HAP differs between individuals depending on their personal history, e.g. living in a region with fluoridated drinking water. Therefore, chemically well-defined, highly compressed and sintered HAP pellets might be a good choice to model tooth surfaces for biofilm formation and biofilm management studies. Preliminary data show potential differences in the *in situ* formation of initial biofilms (5 s to 120 min) and mature bacterial biofilms (up to 48 h) on HAP pellets compared to dental enamel. The examination includes the assessment of coverage, microstructure, thickness and bacterial viability of the biofilms.