



## Biomedical Research Award

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### Synopsis

I finished my Ph.D. and orthodontic specialty combined program from Peking University in Beijing, China in 1998, and began my academic career in the Department of Orthodontics, School and Hospital of Stomatology of Peking university after that. I have also had my visiting scholarship in Seoul National University, Korea in 2001, UIC, US in 2002, and UBC, Canada from 2014-2016. In 2017, I finished the dental specialty assessment and training (DSATP) program at UBC and became a clinical assistant professor teaching in the Orthodontic Graduate Program. In Oct 2018, I was appointed as an Associate Professor with responsibilities in both the graduate and pre-doctoral orthodontic programs at UBC. In the past academic years, I have gained robust teaching, research and clinical experience. I have been presented with Excellence in Teaching Award from both Peking University and UBC. I have been engaged in more than 20 national or international grants as PI or co-Investigator. My research area involves many topics, including open bite, TMD, airway and OSA, 3D imaging and orthodontic-surgery treatment. I have published more than 50 peer-reviewed articles, and 7 chapters or books collaborated with other researchers.

Clear aligner therapy (CAT) has become an alternative to conventional fixed orthodontic appliances (FA) due to its comfortableness, aesthetic appearance and improving effectiveness. Attachments are commonly used in CAT, which might accumulate plaque and derive white spot lesions which are used to claim with FAs. Most commercial composite resins have a minimal antibiofilm effect and biofilms can increasingly build up around the attachments. Therefore, this proposal will establish a standard platform and incorporate two bioceramics, bioactive glass (BAG) and Bredigite (BRT) bioceramics, into currently available attachment material to offer therapeutic effects aiming to reduce white spot lesion development during CAT.

This study was approved by the ethics board at the University of British Columbia, Vancouver, Canada, (H22-01985). With this project, we expect the following outcomes: 1). The biovolume and percentage of killed bacteria data generated from this biofilm model were consistent between different samples and the model provides a standardized platform for antibiofilm analysis of clear aligner attachments; 2). The incorporation of BAG and BRT in the clear aligner attachment inhibits plaque biofilm growth around the composite and kills significantly more biofilm bacteria than the control group; 3). Remineralization effects including enamel crystallization are observed by SEM on the enamel surface after application of BAG and BRT incorporated composites; 4). BAG and BRT groups have higher microhardness values than the control group; 5). BAG and BRT groups have similar shear bond strength when compared to the no-filler control group.

As a result of previous experiences, I have the expertise, leadership and motivation necessary to carry out this proposed research project successfully. I have established strong ties with the principal advisor/mentor, and strictly following the

constructed timeline and budget, I will successfully administer this project and produce several peer-reviewed publications from this proposal. The orthodontic resident will also have the chance to participate in the study as part of his/her thesis project.