Center Award

Dr. Benjamin Wu, *University of California Los Angeles, School of Dentistry*

Dr. Wu is the Chair of Prosthodontics of UCLA School of Dentistry. His main research interest is the development of advanced biomedical devices and characterization of the bio mechanical and biochemical properties of materials, and he has published over 200 articles. His team has developed orthodontic materials, advanced shape memory implant abutment systems, advanced digital solutions for full mouth rehabilitation, and novel elastomeric materials for 3D printed oral-facial prostheses. Dr. Wu also collaborated extensively with Drs. Ting and Moon, and their researches shed light on the interplay between orthobiologic growth factors and adult stem cells in bone repair.

Dr. Ting and Dr. Moon are the Chair and Director of Orthodontics of UCLA School of Dentistry respectively. Dr. Ting and Dr. Moon have extensive experience in clinical orthodontics and research. Dr. Ting's research focuses on molecular biology of tooth movement and bone remodeling, 3D finite element analysis, and he has published over 120 manuscripts in journals in molecular biology, tissue engineering, and orthodontics. Dr. Moon has strong expertise in 3D printing of clear orthodontic aligners, and his researches focus on 3D virtual patient analyses including finite element analysis, micro-implants, and application of 3D printing on orthodontic

Dr. Zhang is a postdoctorial researcher in Dr. Wu's lab. He has multidisciplinary research expertise in biomedical engineering, biomaterial and pharmaceutical sciences. Dr. Fangming Li is the Ph.D. student and Orthodontics resident and has extensive research experience in tissue biology and orthopedic material.

As clear orthodontic aligner treatments gain popularity, there is a corresponding growth in the choice of clear aligner materials from an increasing number of manufacturers. However, there is a general lack of information regarding clinical efficacy and fundamental material properties. This knowledge gap limits the ability for dental practitioners to make informed decisions on materials and products selection.

The long-term objective of this research project is to address this unmet need by developing a multi-institutional collaboration that provides standardized characterization of relevant biomechanical properties and independent evaluation of clinical performance. In our preliminary studies, we developed reproducible protocols to examine a number of key mechanical properties of clear aligners, including stress relaxation, creep, crack resistance, micro-hardness, water absorption and hydrophilicity on thermoplastic materials. The specific aim of this proposal is to refine these protocols on common aligner materials after thermo-processing, and after water absorption. Beyond this proposal, the long-term goal is to establish a data repository to share protocols and test data with other universities and independent institutions around the world to enable collaborative monitoring and analysis.

The clinical impact is to improve patient care by informing dental clinicians with evidence-based material selection in clear orthodontic aligners and provide best care to patients. We especially appreciate AAOF's support to this project, as it will provide us with necessary financial support to carry on this project and provide us with an excellent platform to share our findings to more dental practitioners and educators.