



Dr. Phimon Atsawasuwan
2026 Biomedical Research Award
University of Illinois-Chicago

Dr. Phimon Atsawasuwan is a tenured Professor at the Department of Orthodontics, University of Illinois Chicago, USA, and an Associate Director of Orthodontics Clinical and Translational Sciences Research. With the esthetic and patient-friendly aspects of clear aligner therapy, contemporary orthodontic treatment is witnessing a significant shift towards its adoption. However, increasing reports of proximal caries and decalcification associated with clear aligner therapy have been noted. Fluoride is the gold standard for the anticaries approach in dentistry; however, research into alternatives to fluoride has been on the rise in this field.

Single metal oxide nanoparticles (MO-NPs) were used to prevent oral biofilm formation. However, many MO-NPs exert antibiofilm activity via bactericidal mechanisms, raising questions about their utility in an ecological approach to caries prevention that minimizes the threat of emerging microbial resistance and toxicity.

The primary objective of this proposal is to evaluate the biocompatibility of nanohybrid aggregates in the presence of different clear aligner/retainer materials by assessing cytotoxicity effects and potential leached endocrine-disrupting chemicals from the extract eluents, and evaluate the anti-*Streptococcus mutans* activities of formulated nanohybrid aggregates of nanocerium in the presence of different clear orthodontic aligner/retainer materials in human saliva. In addition, the study will identify the anti-cariogenic activity of nanocerium-based systems in the presence of different orthodontic clear aligner/retainer materials using a clinically relevant *ex vivo* caries model. With the generous support of the American Association of Orthodontists Foundation, we aim to provide an alternative anticariogenic tool, in addition to fluoride, to reduce the incidence of proximal caries associated with clear aligner therapy.

The insights from this study will not only contribute to the body of knowledge surrounding clear aligner therapy but will also help ensure the modality decreases proximal caries and decalcification. The safety and effectiveness of the approach should be taken seriously when incorporated with different types of aligners. Furthermore, this research holds the promise of advancing orthodontic research practices, thereby benefiting both practitioners and patients.