

**AAO Foundation Award Final Report  
(a/o 2/12/08)**

Principal Investigator	Eser Tufekci
Co-Investigator	John C Mitchell
Secondary Investigators	
Award Type	Orhan C. Tuncay Teaching Fellowship Award
Project Title	Development of Resin Modified Bioactive Glass Ionomer Cement for Orthodontic Bonding
Project Year	2006
Institution	Virginia Commonwealth University
Summary/Abstract (250 word maximum)	<p>This study evaluated the Vickers hardness values of resin-modified bioactive glass ionomer cements (RM-BGIC) containing various amounts of bioactive glass (BAG).</p> <p>Bioactive glass (BAG) (75%SiO<sub>2</sub>, 21%CaO, and 4%P<sub>2</sub>O<sub>5</sub>) was synthesized by a sol-gel method, sieved and ground to ~2.0 μm using a micronizer (Sturtevant Inc. Hanover, MA). It was mixed with Fuji ORTHO LC powder in volume ratios of 1:0 (100% Fuji control), 1:3 and 1:1. The powders were mixed with standard Fuji liquid, were placed into cylindrical molds (5x2mm), and pressed between two glass slides. Each disc was light cured individually for 60 seconds per side. Discs were stored in deionized water for 24 hours prior to testing. Vickers hardness indentations were made with a 100g weight (20 seconds), and five separate indentations on each disc (N=5) were measured under 50X magnification. Data were analyzed with ANOVA/Tukey. Statistical significance was set at P &lt; .05.</p> <p>The mean hardness values were 11.08±4.78 and 21.20±4.63 for the experimental groups containing BAG in 1:3 and 1:1 volume fractions, respectively. The mean value for the control group was 62.24±2.64. Experimental groups had significantly lower hardness values than the control group. (P &lt; .05). CONCLUSION: Our results suggest that the novel bioactive RMGI may exhibit different mechanical properties than the control group. Further studies are needed to evaluate the effect of the decreased hardness values on the strength of the bioactive glass containing RMGI cement.</p>
Were the original, specific aims of the proposal realized?	Yes. My research project titled “Development of resin modified bioactive glass ionomer cement for orthodontic bonding” in collaboration with the Oregon Health Sciences University has yielded promising results. In light of preliminary data, we were able to

	<p>determine the ideal bioactive glass/composite resin composition. Currently, we focused our attention to the mechanical and physical properties of the novel orthodontic cement with this composition.</p>
<p>Were the results published? If not, are there plans to publish? If not, why not?</p>	<p>Phelps VP, Tufekci E, Mitchell JC, Davis HB, Moon PC, Ahmetoglu DZ, Lindauer SJ. <i>Hardness of Resin-Modified Bioactive Glass Ionomer Cement</i>. J Dent Res 2008;87:A (Special Issue):Abstract #676.</p>
<p>Have the results of this proposal been presented? If so, when and where? If not, are there plans to do so? If not, why not?</p>	<p>The findings of our study were presented at the annual meeting of the American Association for Dental Research in Dallas, TX, 2008</p>