World Academy of Science, Engineering and Technology
International Journal of Biomedical and Biological Engineering
Vol:10, No:04, 2016

Multilayer Ceramic Capacitors: Based Force Sensor Array for Occlusal Force Measurement

Authors : Sheng-Che Chen, Keng-Ren Lin, Che-Hsin Lin, Hao-Yuan Tseng, Chih-Han Chang

Abstract : Teeth play an important role in providing the essential nutrients. The force loading of chewing on the crow is important condition to evaluate long-term success of many dental treatments. However, the quantification of the force regarding forces are distributed over the dental crow is still not well recognized. This study presents an industrial-grade piezoelectric-based multilayer ceramic capacitors (MLCCs) force sensor for measuring the distribution of the force distribute over the first molar. The developed sensor array is based on a flexible polyimide electrode and barium titanate-based MLCCs. MLCCs are commonly used in the electronic industry and it is a typical electric component composed of $BaTiO_3$, which is used as a capacitive material. The most important is that it also can be used as a force-sensing component by its piezoelectric property. In this study, to increase the sensitivity as well as to reduce the variation of different MLCCs, a treatment process is utilized. The MLCC force sensors are able to measure large forces (above 500 N), making them suitable for measuring the bite forces on the tooth crown. Moreover, the sensors also show good force response and good repeatability.

Keywords : force sensor array, multilayer ceramic capacitors, occlusal force, piezoelectric
Conference Title : ICCB 2016 : International Conference on Computational Biomechanics
Conference Location : Istanbul, Türkiye
Conference Dates : April 19-20, 2016