An elastomeric tactile sensor employing dielectric constant variation and applicable to orthodontia

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Abstract

This paper introduces a capacitive-type elastomeric tactile sensor for the application of orthodontia. Different from many capacitive-type tactile sensors employing gap-distance or electrode-overlap changing for pressure or shear signal measurement, this sensor applies electrostriction effect (dielectric constant change due to dielectric particles distance variation) for signal detection, thus allows electrodes placed on the same plane for orthodontia application. Biocompatible silicon rubber is used as the buffer layer to sustain large force. By particle distance variation increasing the equivalent particle concentration, this sensor can reach a sensitivity of 0.269nF/Mpa with a free load capacitance of 18pF, comparable to those from other type capacitive tactile sensors [1-2]. Fabrication and simulation has been successfully carried out for comparison.