Contribution ID: **8** Type: **Abstract for Research Paper**

AB INITIO STUDY OF TEMPERATURE-DEPENDENT ELASTIC CONSTANTS OF CADMIUM STANNATE AS A SUBSTRATE FOR MANUFACTURE OF MEMS DEVICES

Silicon (Si) is the dominant substrate used in the manufacture of electronic devices, owing to its excellent electrical and electronic properties. However, the shortcomings of Si, especially its poor mechanical properties such as brittleness of its wafers as they are made thinner (less than 40 mm), limit its applications in the manufacture of minute electronic devices such as Micro-electromechnaical systems (MEMS) devices. The search for suitable semiconductors to replace silicon as a substrate in the manufacture of these device sis on the rise, among them being cadmium stannate (Cd2SnO4), which has been found to possess electrical and electronic properties that are comparable to Si. Moreover, Cd2SnO4 thin films are transparent in the ultraviolet-visible wavelength range. This shades light into the possibility of having transparent MEMS devices. However, not much research has been done on the mechanical properties of Cd2SnO4, although it is among the most crucial properties for MEMS devices that operate under harsh environment. A recent study by Ongwen et al (Ongwen, N., Ogam, E. & Otunga, H. (2020). Ab initio study of elastic properties of orthorhombic cadmium stannate as a substrate for the manufacture of MEMS devices, Materials Today Communications, (In press), 1-7) considered ab-initio study of elastic properties of Cd2SnO4 at the ground state, where the values of elastic constants were found to be comparable to those of Si. However, it is worthwhile noting that MEMS operate under varying temperature conditions. Thus, temperature-dependent elastic constants of Cd2SnO4 are worth looking into. In the present study, we are investigating the temperature-dependent elastic constants of Cd2SnO4 at a temperature range of 273 – 473 K. a comparison shall also be made with those of Si within the same temperature range. The study is expected to shed more light into the behavior of elastic constants of Cd2SnO4 as temperatures varies.

Primary authors: Mr ONGWEN, Nicholas (Maseno University); Dr OGAM, Erick (Laboratory of Mechanics and Acoustics); Dr OTUNGA, Henry (Maseno University); Prof. ODUOR, Andrew (Maseno University)

Track Classification: Computational Modelling of Materials