Abstract

Microelectromechanical systems (MEMS) are devices constructed on the micron scale and have potential in a diversity of functions. Their precision and scalability allow for such diversity and MEMS have therefore nested themselves well in numerous academic and industrial sectors. Research has shown that MEMS devices have the capacity to be utilised as micro-object characterization tools where one sub-category is the diagnosis of certain diseases which affect a cell's mechanical integrity. Through a collaboration between the Faculty of Engineering and the Faculty of ICT, this project set out to design and develop MEMS devices suitable for manipulation and mechanical characterisation of single biological cells suspended in aqueous media. Such applications impart strict thermal and structural specifications by which potential MEMS devices must abide to perform the exercise without damaging the biological cells. Several device configurations were designed and fabricated using a commercially available fabrication technology known as SOIMUMPs™. State-of-the-art finite element analysis techniques together with experimental testing have demonstrated that the devices are potential candidates for the intended function.