# Simulation of Piezoelectrically Actuated Drug Delivery Device for Biomedical Application

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## Abstract

Implantable devices that detect and treat diseases without any intervention required from the patient are expected to be the trend of the future. This paper presents the design and simulation of such devices that is capable to deliver the drug to the target in a controlled manner. We have developed a peizo electrically controlled MEMS drug delivery device for on-demand release of defined quantities of drug. A drug-loaded micro reservoir (∅6mm×550μm) is sealed by A membrane placed over the drug reservoir on which the piezoelectric material is deposited. On application of voltage across this piezoelectric material , the membrane deflects allowing the fluid to fill into the chamber which will mix with the drug and due to concentration variation the drug would come off the reservoir or vice versa. A 0.3μm-thick PZT material is deposited on the 20um PDMS membrane. Discharge of the drug solution and the release rates are controlled by an external electric field.
Key words: Drug delivery, PZT material.

## Reference

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2)A. Nisar, N. Afzulpurkar, B. Mahaisavariya and A. Tuantranont, “MEMS-based micropumps in drug delivery and biomedical applications”, Sensors and Actuators B: Chemical, Article in press, 2007

## Figures used in the abstract

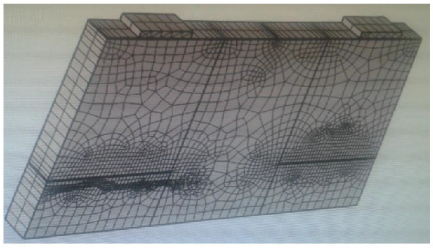

**Figure 1**: Device structure with mesh.

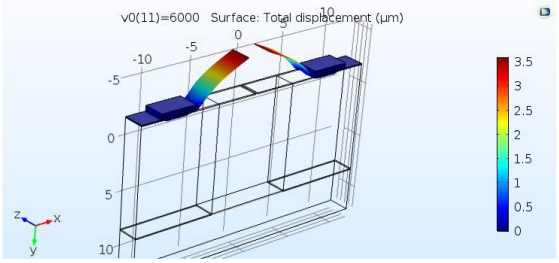


**Figure 2**: Displacement of membrane on application of electric filed.