# Polysilicon nanogap fabrication using a thermal oxidation process


## Abstract

Purpose - Nanogap electrodes have important applications in power saving devices, electrochemical sensors and dielectric detections of biomolecules. The purpose of this paper is to report on the fabrication and characterization of polysilicon nanogap patterning using novelties technique. Design/methodology/ approach - Polysilicon material is used to fabricate the nanogap structure and gold is used for the electrode and two chrome masks are used to complete this work; the first mask for the nanogap pattern and a second mask for the electrode. The method is based on the control of the coefficients (temperature and time) with an improved pattern size resolution thermal oxidation. Findings - Physical characterization by scanning electron microscopy (SEM) demonstrates such nanogap electrodes could be produced with high reproducibility and precision. Electrical characterization shows that nanogap enhanced the sensitivity of the device by increase the capacitance and the conductivity as well. They have also good efficiency of power consumption with high insulation properties. Originality/value - With this technique, there are no principal limitations to fabricating nanostructures with different layouts down to several different nanometer dimensions. The paper documents the fabrication of nanogaps electrodes on a polysilicon, using low-cost techniques such as vacuum deposition and conventional lithography. Polysilicon is a low-cost materials and has desirable properties for semiconductor applications. A method of preparing a nanogap electrode according to the present innovation has an advantage of providing active surface that can easily be modified for immobilizations of biomolecules.