

# **Fabrication and Characterization of Mechanical Resonators Integrating Microcontact Printed PZT Films**

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We report on the fabrication and characterization of lead zirconate titanate (PZT)-coated cantilever resonators for the realization of piezoelectric nanoelectromechanical systems (NEMS) with integrated actuation and detection capabilities. PZT is deposited by microcontact printing, resulting in a relatively thin PZT film without deterioration of its piezoelectric properties induced by etching damage. The cantilever fabrication process is based on stepper ultraviolet lithography and standard micromachining. Electrical characterization was carried out with a dedicated electrical set-up enabling the devices' resonance frequency to be detected through the piezoelectric response. These characterizations validate the simultaneous actuation and detection capability of the PZT layer. Finally, modeling of the PZT cantilever results in the estimation of the piezoelectric coupling coefficient  $d^*(31)$ . We have found excellent large signal  $d^*(31)$  of around 200 pm/V, even for PZT cantilevers with reduced dimensions.