A Large-strain, Arrayable Piezoelectric Microcellular Actuator by Folding Assembly

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A low-power, piezoelectric, contracting cellular MEMS actuator has been developed that demonstrates a peak strain of 3% under a 10 V stimulus. Since the motion of the end effector is linear and in-plane, the actuator can be arrayed in series to amplify the total stroke or in parallel to amplify the total force, as needed. Location of the piezoelectric member through the structural center of stiffness reduces the potential for parasitic out of plane bending present in previous designs [1].

Cellular actuators arrays can be assembled into a larger array of actuators. We demonstrated that sets of cellular microactuators can be assembled out of plane by folding them over thin gold hinges. To our knowledge, this study is the first effort in this field. The gold hinges serve dually as mechanical assembly guides and electrical interconnects. Long chains of devices may be assembled by rolling out of plane. Figure 2 shows a smaller collection, assembled by folding three actuator triplets onto one another. Actuation of the collection is contingent on the manufacturing of functional thin-film PZT.

**References**