

Fabrication of a Novel Monolithic NiTi Based Shape Memory Microgripper via Multiple Memory Material Processing

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The exciting thermomechanical behavior of nickel-titanium shape memory alloys have sparked significant research efforts seeking to exploit their exotic shape memory properties. The performance capabilities of conventional nickel-titanium alloys are currently limited, however, by the retention of only one shape memory geometry. In this paper we demonstrate the application of an unprecedented manufacturing process known as Multiple Memory Material technology to create a novel monolithic nickel-titanium shape memory microgripper. In our design, actuation and gripping maneuvers are achieved by thermally activating processed material regions which possess unique shape memory transformation temperatures and shape set geometries. The existence of multiple shape memory regimes is confirmed through differential scanning calorimetry analysis and in situ resistivity measurements.