**Effect of polydimethylsiloxane (PDMS) coating on the behavior of Shape Memory Alloy (SMA) actuator**

ABSTRACT

Shape Memory Alloy (SMA) is a memory metal where it is able to return its initial shape after deformation. SMA will contract when heated and return to its original shape. Thus, SMA can be used as an actuator and it is simpler compared to motor (servo) and piezoelectric. SMA is considered as clean technology as it requires small amount of power to produce large actuation. SMA wire is heated by joule heating when applying an electric current through it, resulting in contraction. SMA is also lightweight, making it an ideal actuator for a flapping wing micro air vehicle (MAV) design that has weight and space constraints. However, the SMA's behavior is nonlinear and the cooling rate is slow. A feedback control system is required to produce accurate actuation of the SMA and a cooling method needs to be included in the design. In this research work, polydimethylsiloxane (PDMS) was used to improve the cooling of the SMA actuator. PDMS is a flexible for wide range of temperature (-40oC to 400oC) which ideally can be used for SMA with temperature reaching up to 70pC during heating. The behavior of SMA with and without PDMS were analyzed to investigate the effects on the feedback response of the SMA actuator. It was found that the PDMS coating increased efficiency of the SMA actuation by improving the time response and reducing the overshoot of the response of the SMA actuator.

**Keyword:** PDMS; SMA; Flapping wing; Actuator