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SecureMEMS: Selective Deposition of Energetic Materials

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ABSTRACT

There exists a pressing operational need to secure and control access to high-valued electromechanical systems, and in some cases render them inoperable. Developing a reliable method for depositing energetic materials will allow for the near-seamless integration of electromechanical systems and energetic material, and, in turn, provide the pathway for security and selective destruction that is needed. In this work, piezoelectric inkjet printing was used to selectively deposit energetic materials. Nanothermites, comprising of nanoscale aluminum and nanoscale copper oxide suspended in dimethyl-formamide (DMF), were printed onto silicon wafers, which enabled both thermal and thrust measurements of the decomposing energetic material. Various solids loadings were studied in order to optimize printing characteristics. Going forward, further studies will focus on the plausibility of inkjet printing other energetic materials for the purposes of the degradation of electromechanical systems.

KEYWORDS

Piezoelectric Inkjet Printing, MEMS, Energetic, Thermite