

Abstract Submitted
for the TSF15 Meeting of
The American Physical Society

Linear actuators based on nano-energetic active materials MKHITAR HOBOSYAN, University of Texas at Rio Grande Valley, PATRICIA MARTINEZ, ANVAR ZAKHIDOV, University of Texas at Dallas, KAREN MARTIROSYAN, University of Texas at Rio Grande Valley, UTRGV/UTD COLLABORATION — The nanoenergetic materials (NM) are nano-structured mixtures of fuel (metal nanoparticles, usually Al or Mg) and non-metal or metal oxides (Bi_2O_3 , CuO , I_2O_5 , Fe_2O_3 etc). In this report we implanted NMs in multi-walled carbon nanotube (MWCNT) yarns to produce linear actuators for various applications. The actuation force can be tuned by using various atmospheres (ambient, inert, and vacuum) and by adjusting the NM loading density, MWCNT/NM weight ratio, yarn type and rotation number, as well as the type of NM utilized for yarn preparation. The combustion wave speed can reach up to 10 m/s to achieve adjustable actuation effective force up to 22 N/g. Although the combustion temperature is above 700 °C, the MWCNTs yarn is well preserved after the actuation. The proof of concept actuation of loading different mass demonstrated the possibility to apply this method in ambient, inert and vacuum environment, where other actuation methods can be difficult to apply.

Mkhitar Hobosyan
University of Texas at Rio Grande Valley

Date submitted: 30 Sep 2015

Electronic form version 1.4