Carbon Nanotubes Forests and Yarns for Nanoenergetic Materials PATRICIA MARTINEZ, ANVAR ZAKHIDOV, University of Texas at Dallas, KAREN MARTIROSYAN, MKHITAR HOBOSYAN, University of Texas at Brownsville, NANOTECH INSTITUTE UNIVERSITY OF TEXAS AT DALLAS COLLABORATION, NANOCIENCE LABORATORY UNIVERSITY OF TEXAS AT BROWNSVILLE COLLABORATION — A novel nanoenergetic yarn composite was fashioned by composing multi-walled carbon nanotube (MWCNT) sheets embedded with Al-I_2O_5 clusters, a nanoenergetic material (NM) whose volumetric energy is two orders of magnitude greater than that of Trinitrotoluene (TNT) and with a detonation velocity of approximately 2500 m/s. The NM/MWCNT composites were spin-twisted to create nanoenergetic yarns. MWCNTs were selected as the substrate matrix due to their unique intrinsic properties of high heat dissipation, high tensile stress and elasticity, all of which can be used in the manipulation and distribution of thermal energy during the nanoexplosions of the Al-I2O5 clusters. The detonation of the composite showed that MWCNT do not burn, but rather, they direct the explosion of NM along the twisted yarn. The thread-like structure of the composites allows the utilization of textile technologies to create complex weaves which can be used in new industrial and scientific applications as nanoexplosive fabrics with desired energetic properties.

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