Electronic Supporting Information

Direct Deposit Laminate Nanocomposites with Enchanced Propellent Properties

Xiangyu Li[†], Philip Guerieri[‡], Wenbo Zhou[‡], Chuan Huang[†‡], Michael R. Zachariah*

Department of Chemical and Biomolecular Engineering and Department of Chemistry and Biochemistry, University of Maryland, College Park, MD 20742, USA.

*Corresponding author: mrz@umd.edu

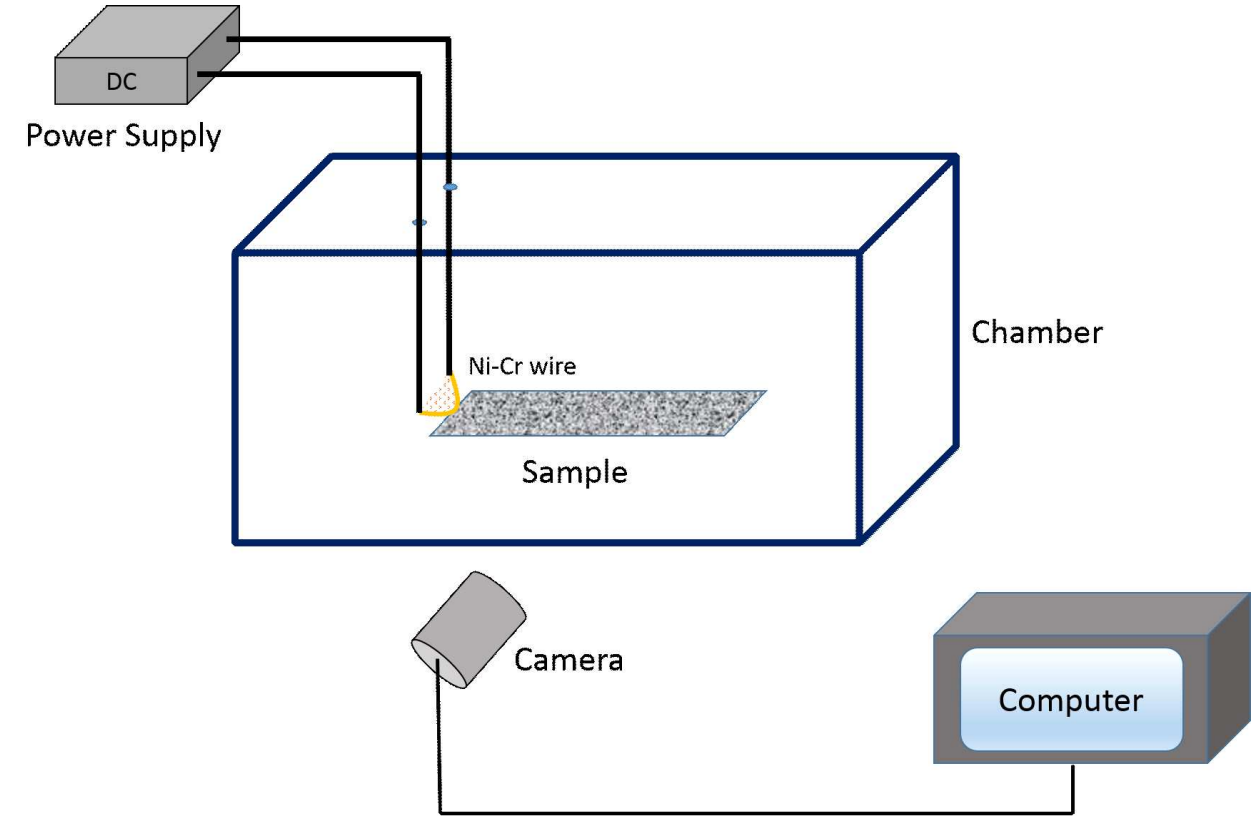

Figure S1. Illustration of the combustion test setup.

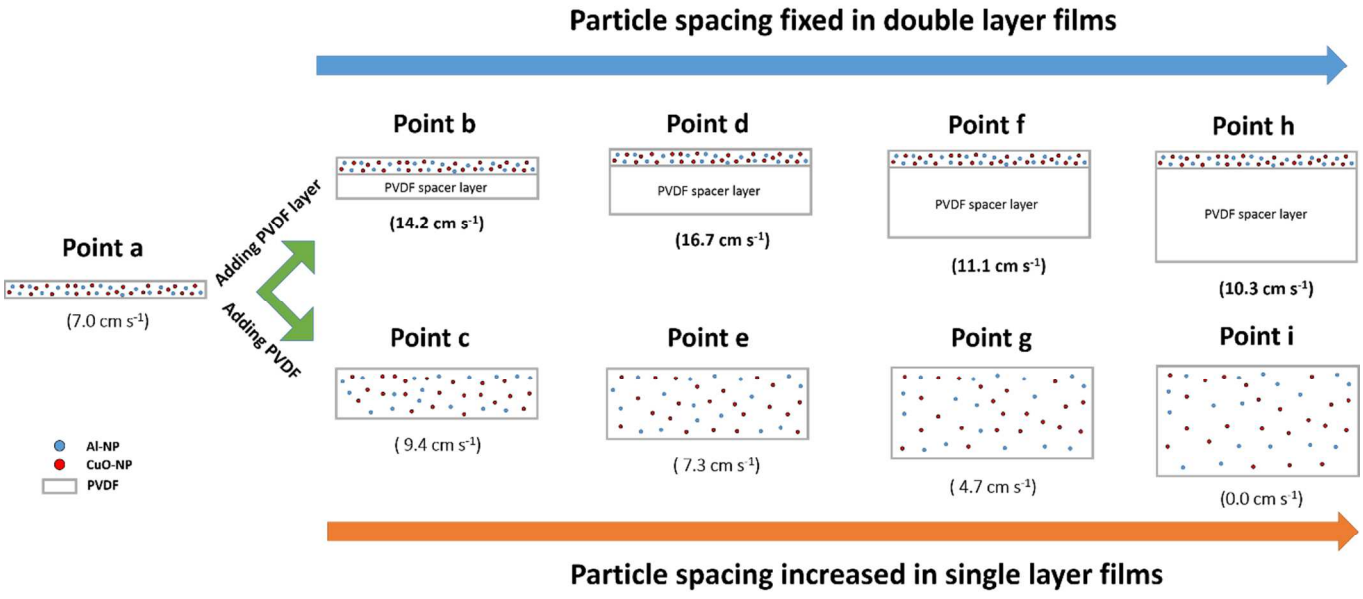

Figure S2. Difference of the particle spacing in double layer thermite film and corresponding single layer film.

Table S1. Mechanical properties of laminate and single films.

	Film 1*	Film 2 *	Film 3*
Tensile Strength (MPa)	7.50 ± 0.08	12.20 ± 0.12	7.60 ± 0.09
Ultimate Strain	0.076 ± 0.007	0.58 ± 0.03	0.091 ± 0.01
Toughness (MJ m^{-3})	0.06 ± 0.01	2.24 ± 0.06	0.45 ± 0.04

* Film 1: Thermite /PVDF; Film 2: Film 1 with additional PVDF spacer layers to create a 6 layer film, Film 3: Film 2 but with the thermite particles dispersed evenly.

Table S2. Performance comparison of 6 layer laminate film with other similar energetic composite.

Structure	Composition (Mass ratio)	Propagation Velocity (cm/s)	Tensile Strength (MPa)	Strain	Toughness (MJ m^{-3})
6 layers	PVDF/Al/CuO =39/26/35	9.4 (In Ar)	12.20	0.58	2.24
Single layer[32]	PVDF/Al=50/50	8.6 (In Ar)	11.00	0.031	0.28