Supporting information for

Spinel/Perovskite Cobaltite Nanocomposites Synthesized by Combinatorial Pulsed Laser Deposition

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**Figure S1.** Comparison of the HRXRD 2θ-ω scans of LSC/CFO grown at 680 °C, with the fraction of CFO increasing from sample #1 to sample #3.
Figure S2. HRTEM image and corresponding Fast Fourier transform (FFT) pattern of LSC/CFO grown with 2 Hz laser frequency ($n_1=50$; $n_2=200$, $N=300$).

Figure S3. X-ray diffraction reciprocal space map of LSC/CFO on STO (100) grown at 600°C using 2 Hz laser rate.
Figure S4: (a) Top surface and (b) cross sectional SEM image of BSCF/CFO nanocomposite structure grown at 600°C, 10 Hz, \( n_1 = 50; n_2 = 200, N = 300 \); (c) HRTEM image of BSCF/CFO; (d) 2θ-ω scan of LSC/CFO, BSCF/CFO nano-composite and CFO single phase films; (e) In plane (IP) and out of plane (OP) magnetization loops of BSCF/CFO nanocomposite
Figure S5: In plane (IP) and out of plane (OP) hysteresis loops of LSC/CFO nanocomposite grown at 680 °C, with the fraction of CFO increasing from sample #1 to sample #3 of Figure 2. (a-c) before and (d-f) after HCl etching.
**Figure S6**: In plane (IP) and out of plane (OP) hysteresis loops of an LSC single phase film.