Supplementary information for:

From $CsPbBr_3$ Nano-Inks to Sintered $CsPbBr_3$-$CsPb_2Br_5$ Films *via* Thermal Annealing: Implications on Optoelectronic Properties

Francisco Palazon,[†] Sedat Dogan,[†] Sergio Marras,[‡] Federico Locardi,[§] Ilaria Nelli,[§ †] Prachi Rastogi,[†] [§] Maurizio Ferretti,[§] Mirko Prato,[‡] Roman Krahne,[†] and Liberato Manna[†]*

[†] Nanochemistry Department and [‡] Materials Characterization Facility, Istituto Italiano di Tecnologia, Via Morego 30, 16163 Genova, Italy

[§] Dipartimento di Chimica e Chimica Industriale, Università degli Studi di Genova, Via Dodecaneso 31, 16146 Genova, Italy

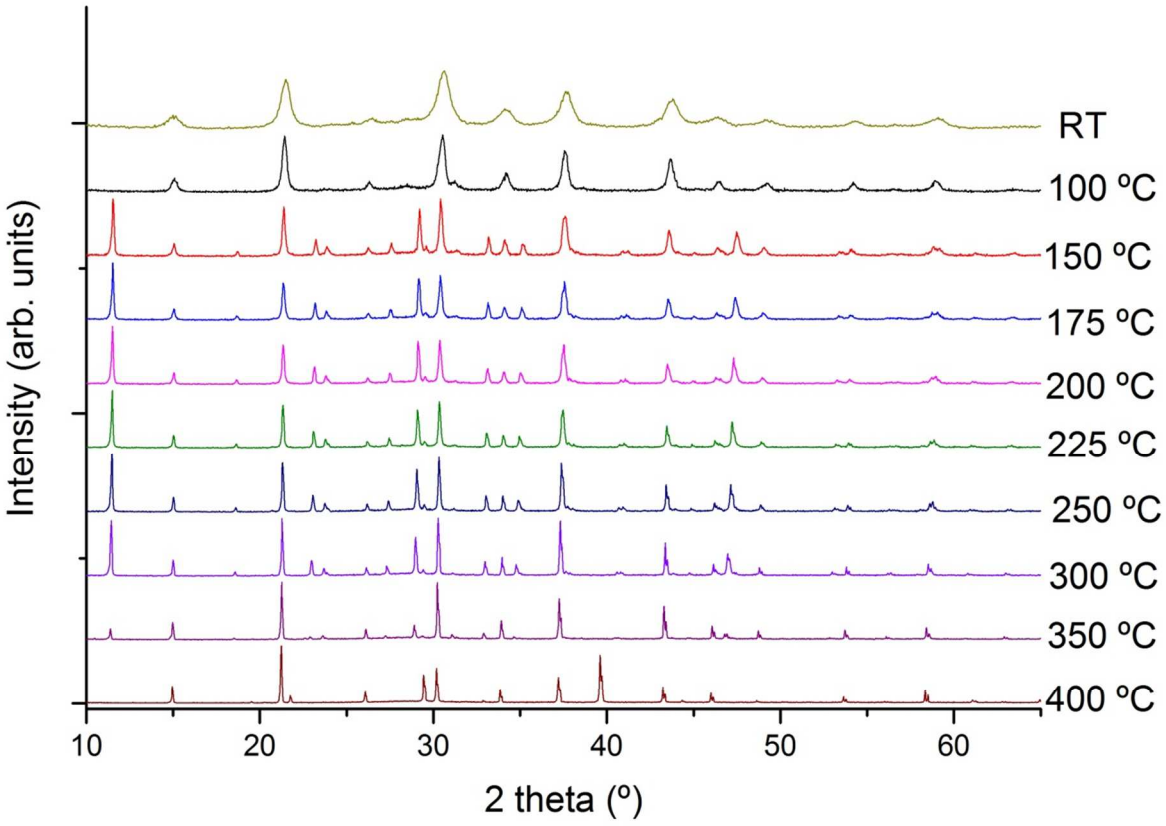

Figure S1. XRD diffractograms of sample annealed at different temperatures between RT and 400 ºC.

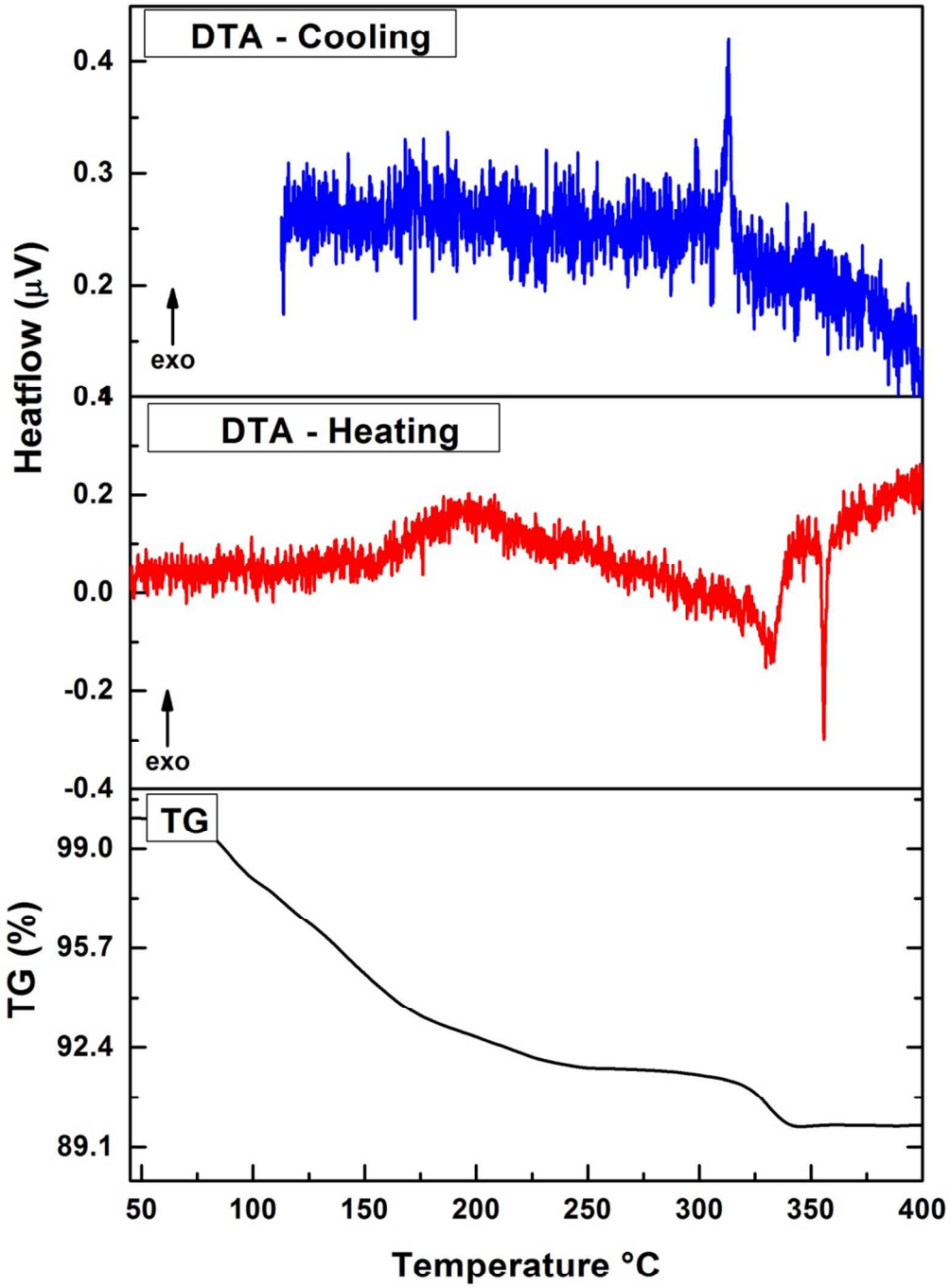

Figure S 2. TG and DTA (heating and cooling) curves from 35 ºC to 400 ºC.

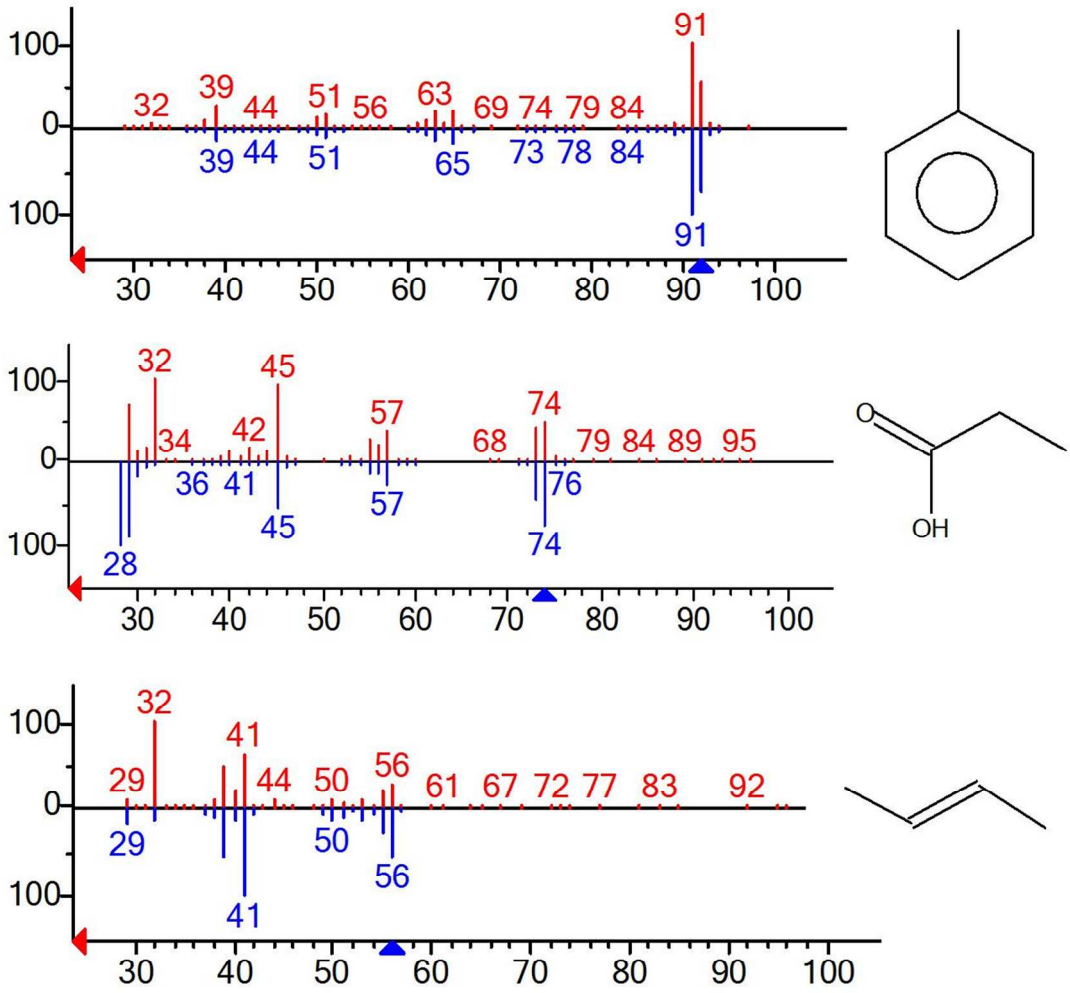

Figure S3. Experimental (red) and theoretical (blue) mass spectra (from top to bottom) of toluene, propionic acid and 2-butene. The experimental spectra were measured respectively at 110°C, 160°C and 325°C.

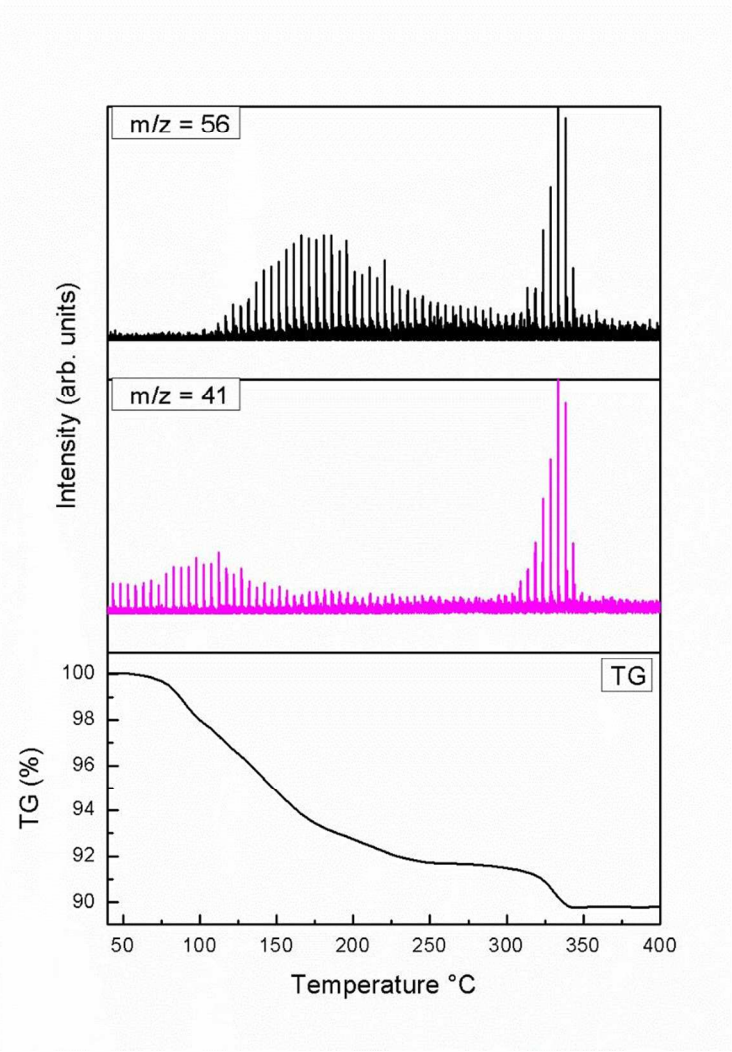

Figure S4. Intensity behavior of m/z = 41 and 56 (the two highest peak of the 2-butene). The contemporary presence only above 275°C demonstrates the presence of the 2-butene only between 275°C and 350°C. The m/z = 56 and 41 below 275°C are attributable to propionic acid and toluene respectively.

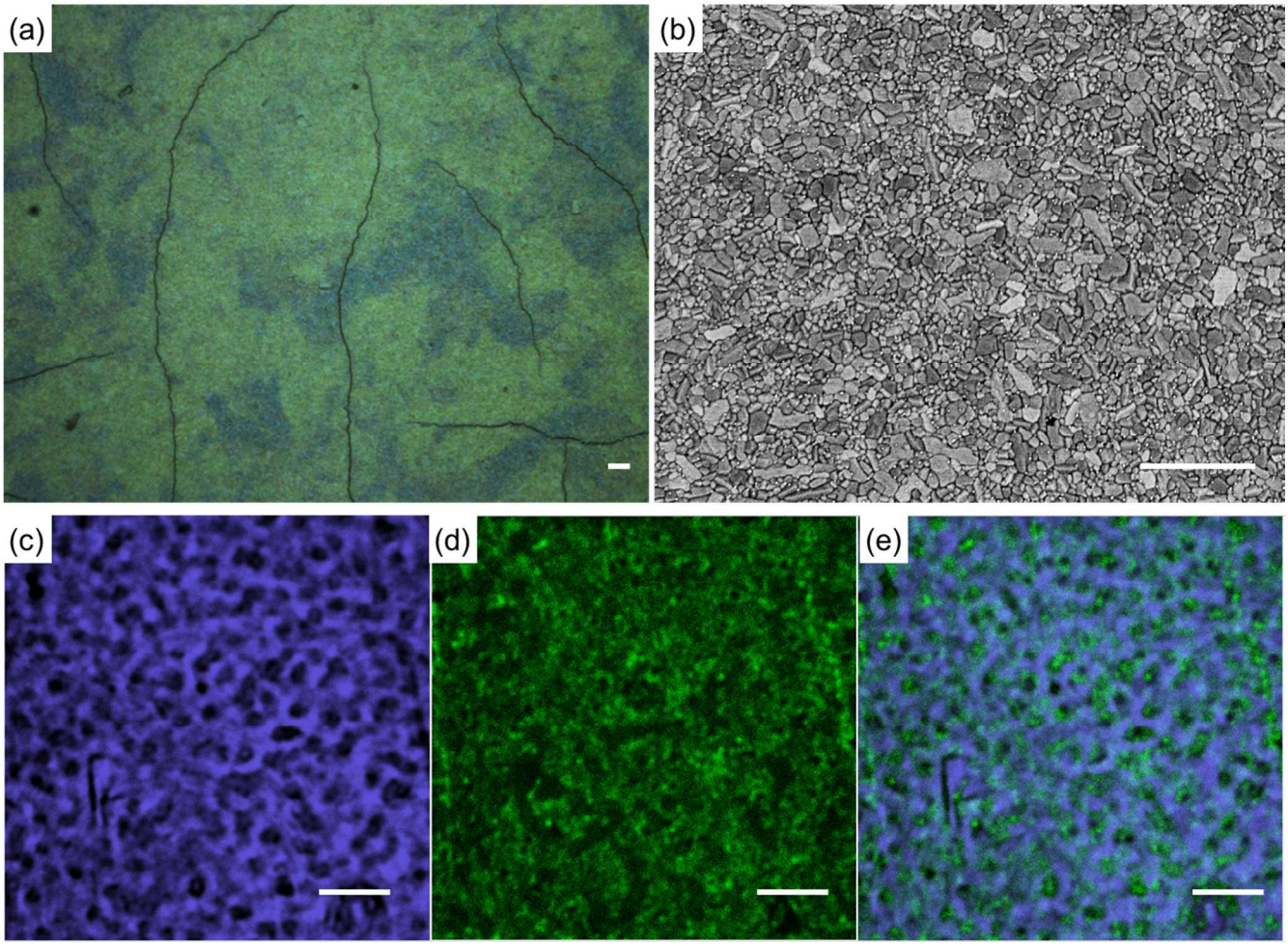

Figure S5. Optical image (a), SEM with backscattered electron image (b), and confocal microscopy images that record the reflected light at 457 nm (c) and the PL emission in the band from 500 – 550 nm (d) of a film annealed at 200 °C; (e) is an over lay of the images in (c) and (d). Scale bars correspond to 5 µm. Comparison of the SEM image with the reflection image in (c) shows that the dark spots (low reflected signal) in (c) do not correspond to the topography of the film. The overlay in (e) indicates that the PL emission is stronger from the dark regions in (c). This suggests that the dark regions are composed of $CsPbBr_3$ that absorbs light at 457 nm (and emits at 520 nm), while the blue regions in (c) could predominantly consist of $CsPb_2Br_5$. Note that also in the backscattered electron SEM image regions with darker and brighter contrast are present that could indicate the different composition.

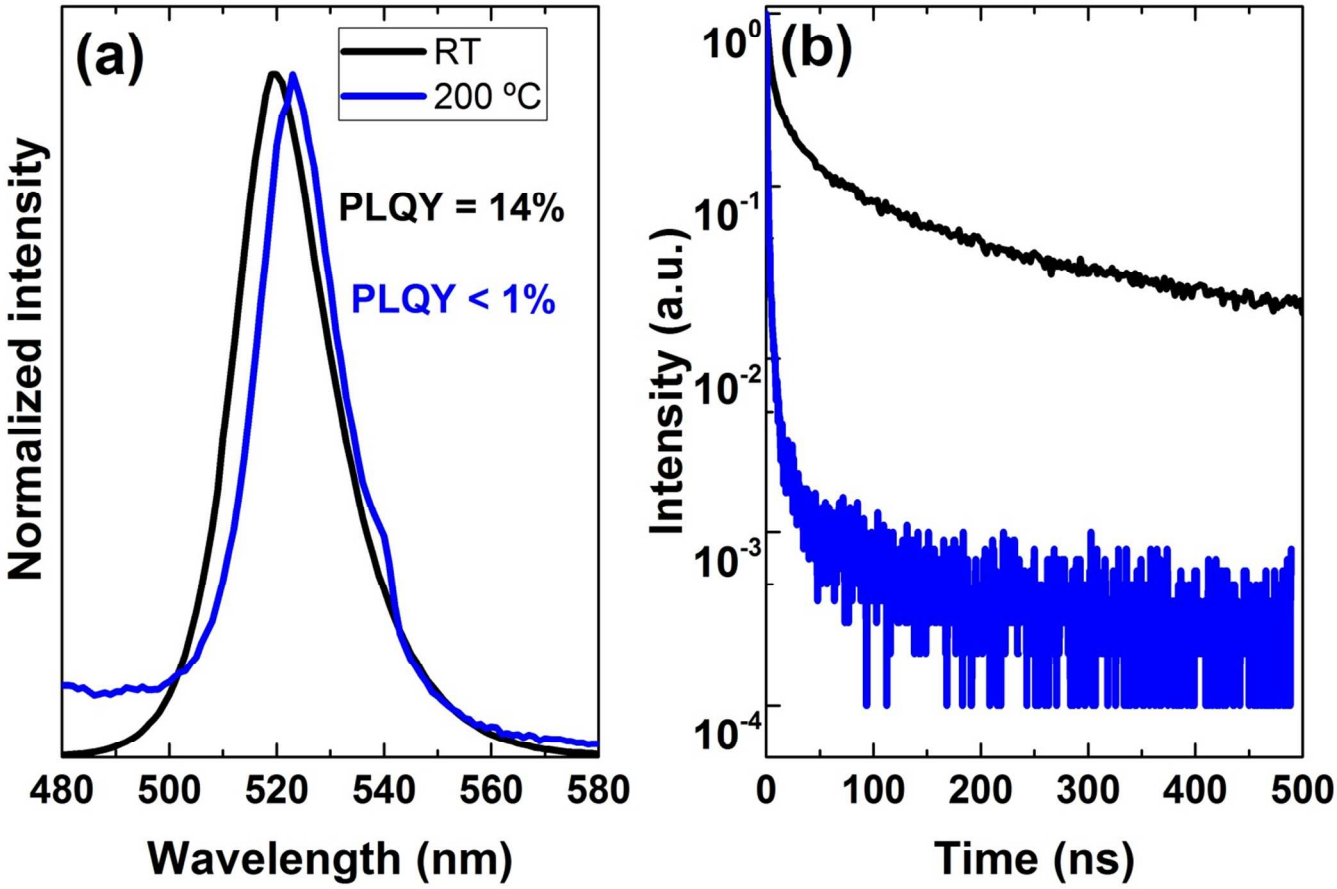

Figure S 6. (a) Photoluminescence spectra and (b) Photoluminescence decay of pristine (RT) film and annealed at 200 °C.