Supporting Information

Fly-through synthesis of nanoparticles on textile and paper substrates

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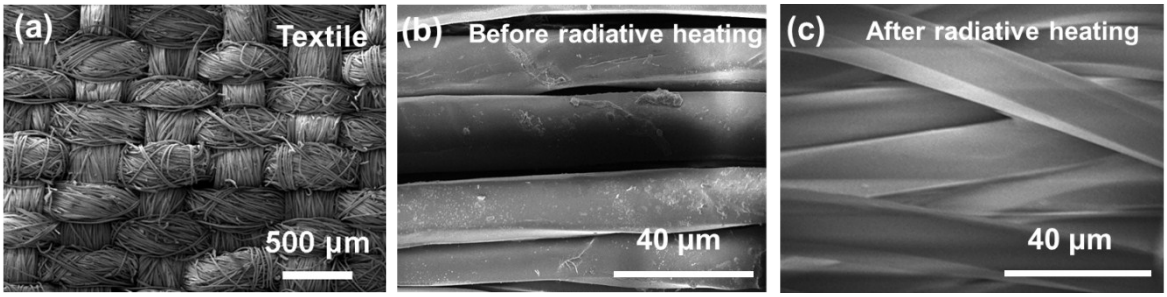

Figure S1. The low magnification morphology of the textile with Pt salt precursor (a, b) before and (c) after radiative heating.

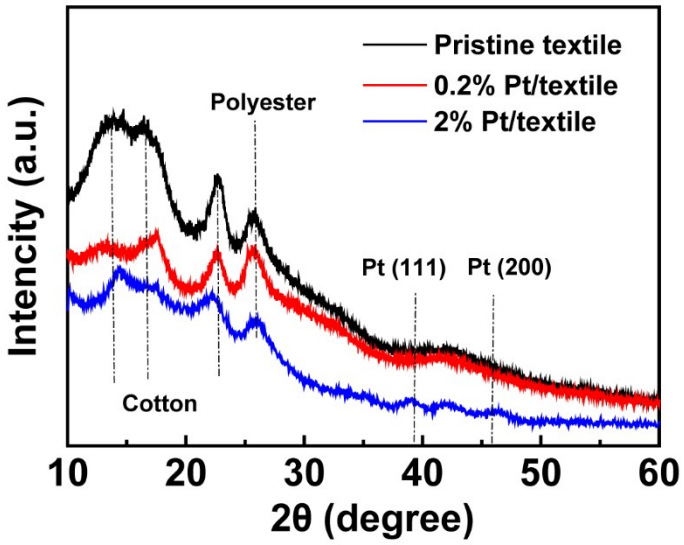

Figure S2. XRD profiles of the textile before and after radiative heating. Typical platinum diffraction peaks at 39.7º and 46.4º can be observed for the high Pt mass loading (2 wt%) Pt/textile sample, which could be assigned to the (111) and (200) crystalline planes, respectively. Importantly, the structure of the textile is well retained after the high temperature radiative heating, as the main peaks of cotton and polyester did not change. For a lower loading (0.2 wt% Pt) sample, the typical Pt peaks did not appear in the XRD curve, which is likely due to the strong background signal of textile substrate because of the low mass loading and small size of the Pt nanoparticles.

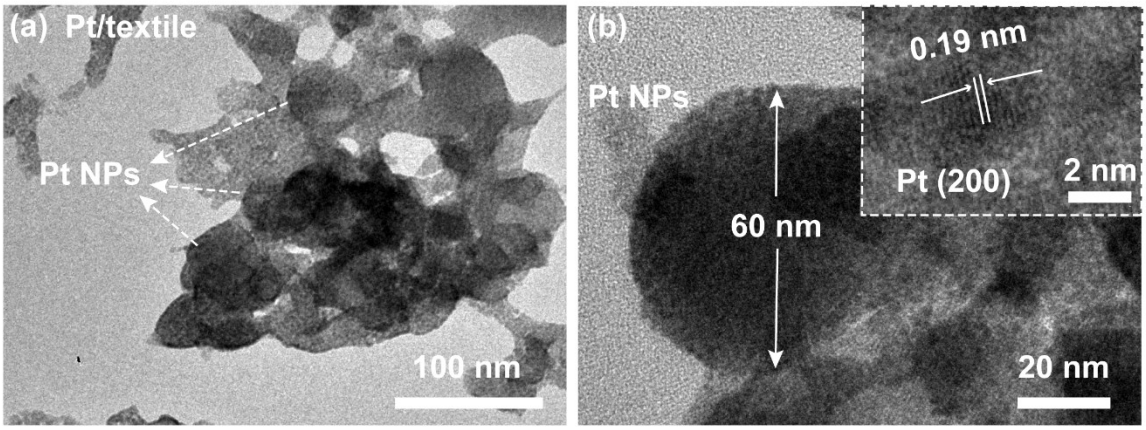

Figure S3. (a-b) TEM characterization of Pt nanoparticles formed in the Pt/textile sample. As the textile fibers are too thick for the TEM characterization, the Pt/textile samples are crushed into small pieces and bath sonicated for 1.5 h in ethanol for dispersion. The platinum nanoparticles show a particle size of ~60 nm, which is consistent with our SEM results. Note, there are fibrous fragments of textile fibers remaining in the TEM samples surrounding these nanoparticles. The high-magnification TEM image (inset) demonstrated the lattice fringe with a space of 0.19 nm, corresponding to the (200) crystalline plane for the face-centered cubic platinum nanoparticles.

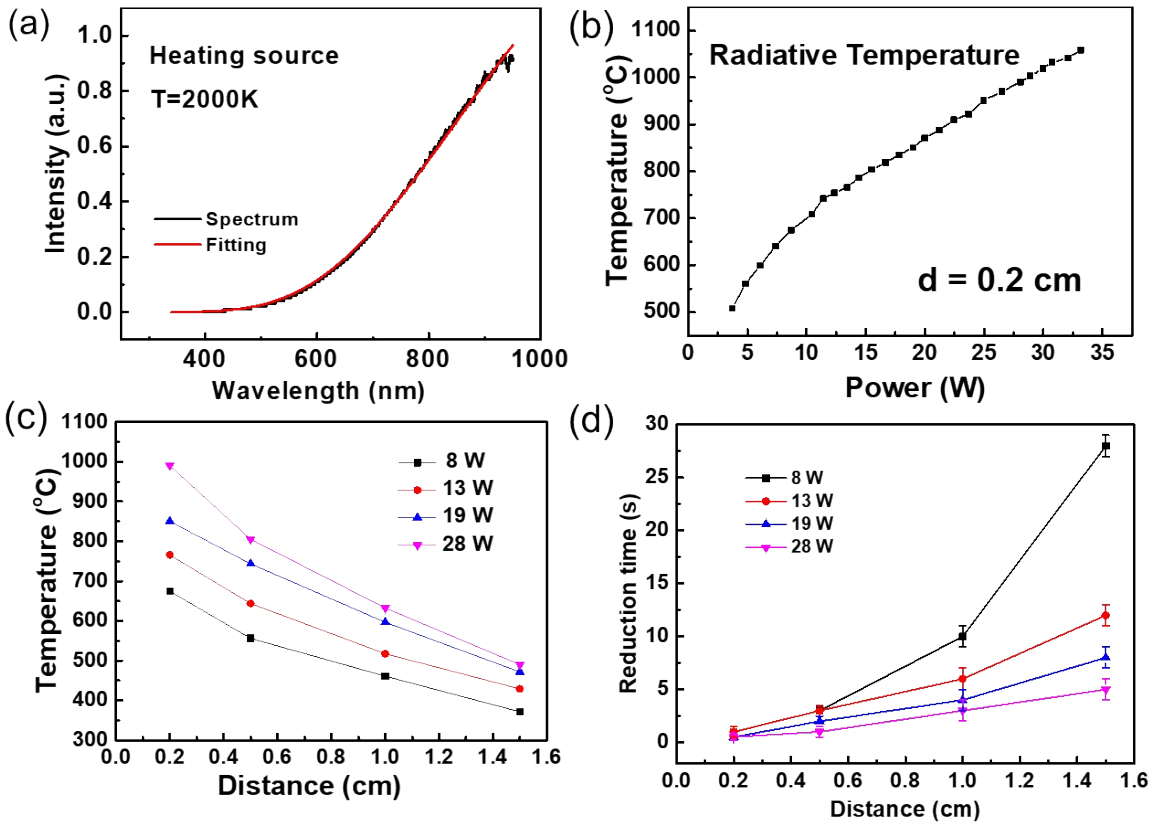

Figure S4 (a) The temperature of the heating source (2000 K) as determined by fitting the emitted spectrum to a gray body radiative source. (b) The radiative temperature at a distance of 0.2 cm from the heating source as it varies with the input power to the emissive heating source. (c) The radiative temperature and as a function of the distance from the heating source at different powers. (d) The reduction time of the textile with Pt precursor at different distance from heating source.

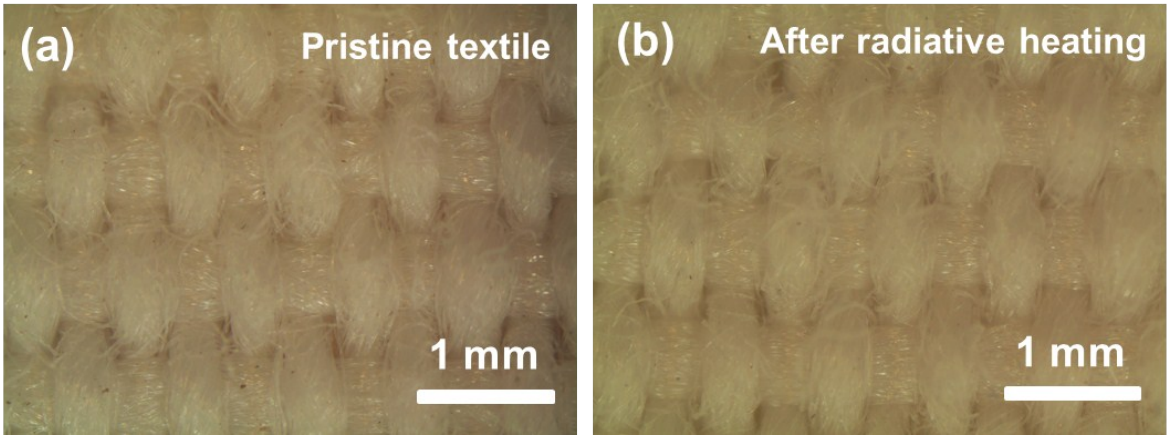

Figure S5. Microscopy images of the pristine textile (a) before and (b) after radiative heating.

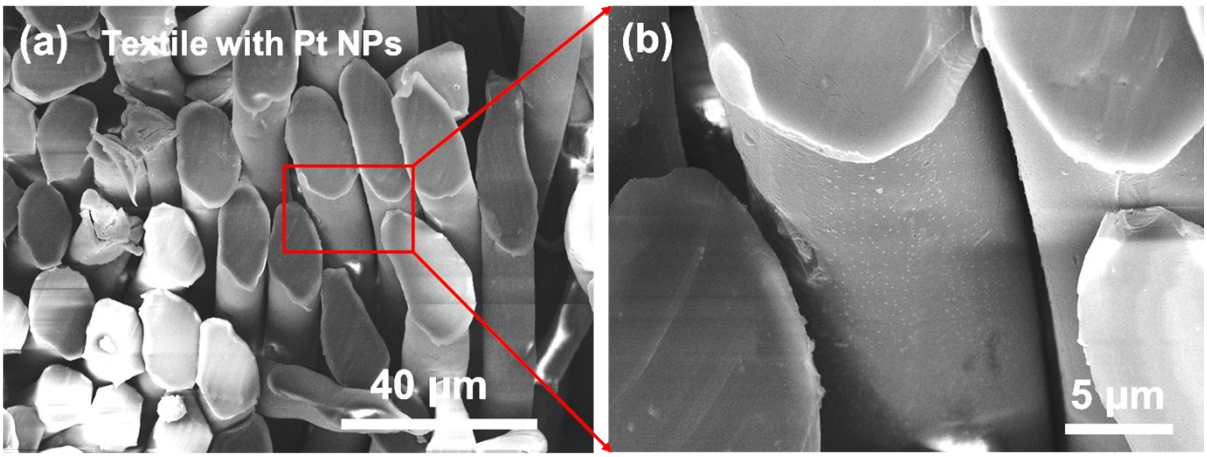

Figure S6. Cross sectional SEM images of the textile with Pt nanoparticles after the radiative heating method.