$BaTiO_3$, $SrTiO_3$, $CaTiO_3$ and $Ba_xSr_{1-x}TiO_3$ particles: A General Approach for Monodisperse Colloidal Perovskites

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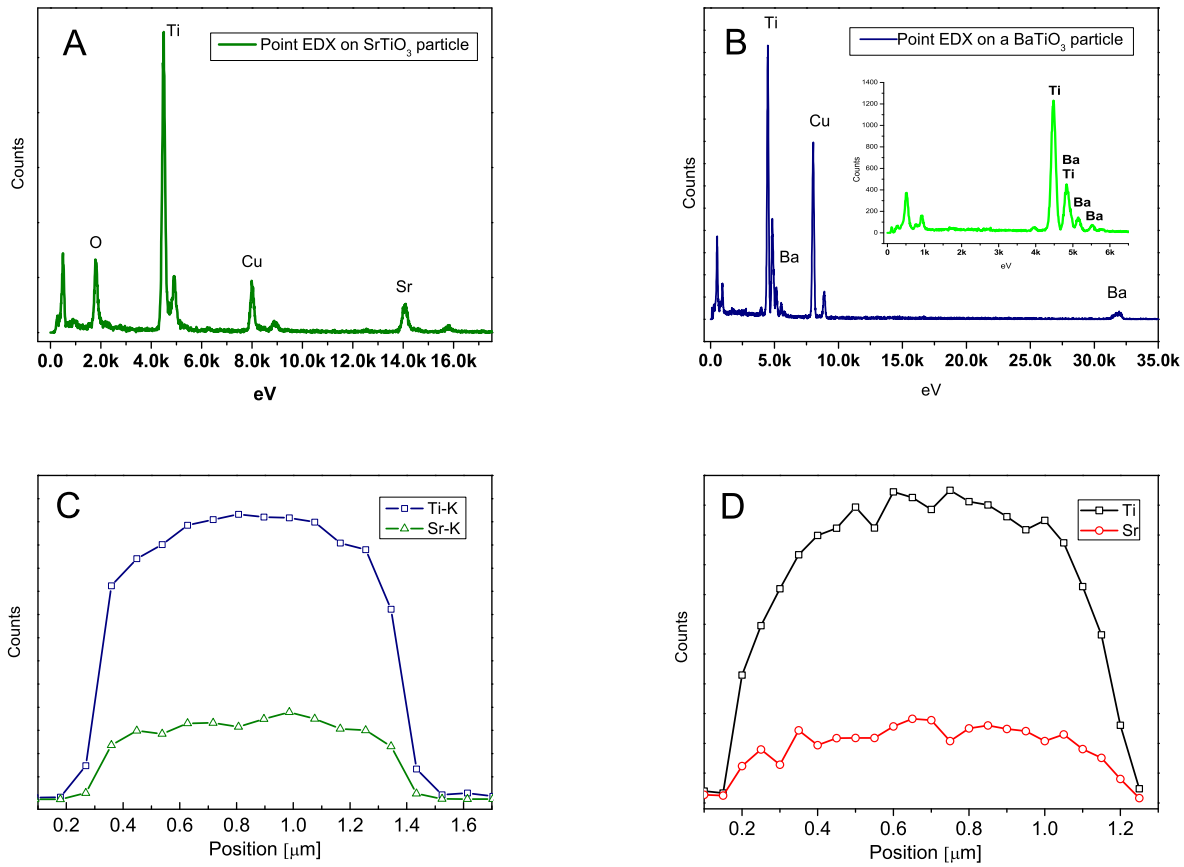

Figure S1. The EDX measurements on perovskite particles. (a) EDX spectrum on a spot at a $SrTiO_3$ particle (b) EDX spectrum on a spot at a $BaTiO_3$ particle, inset is the zoom to the region

between 1-6 keV where the Ti and Ba peaks overlap, however Ba has 4 peaks with decaying intensity (Ti has 2 peaks). Here the last two are clearly visible, (c) EDX profile of a line-scan on a $SrTiO_3$ gel particle prior to calcination, (d) EDX profile of a line-scan on a $SrTiO_3$ particle after calcination at 900^{o}C for 1 hour

Energy-Dispersive X-ray Spectroscopy (EDX). The elemental microanalysis of perovskite particles were achieved by performing EDX measurements on a Philips Tecnai 20F high-resolution transmission electron microscope operated at 200 keV, in scanning mode (STEM). The same types of samples as for TEM were used. The identical profile of EDX for gel and crystalline $SrTiO_3$ particles proves that the metal cations are well dispersed in the particle prior to calcination.

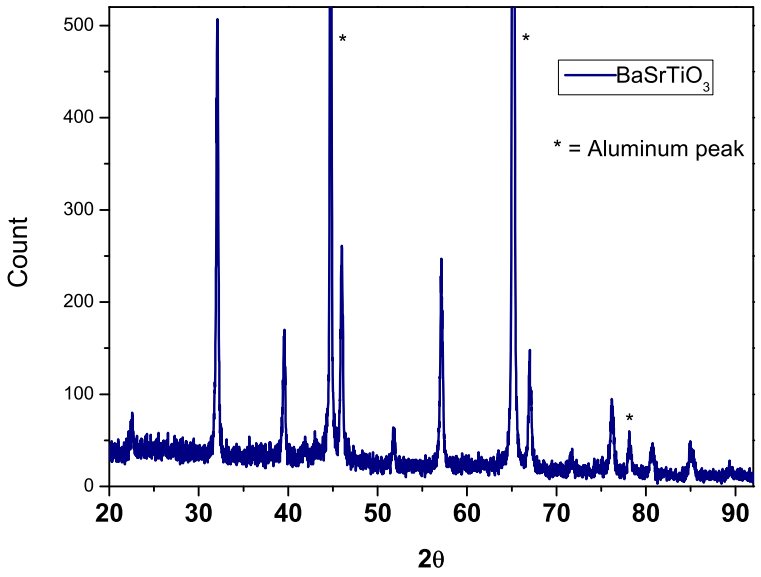

Figure S2. The full XRD pattern of the $BaSrTiO_3$ particles calcined at 900^{o}C.

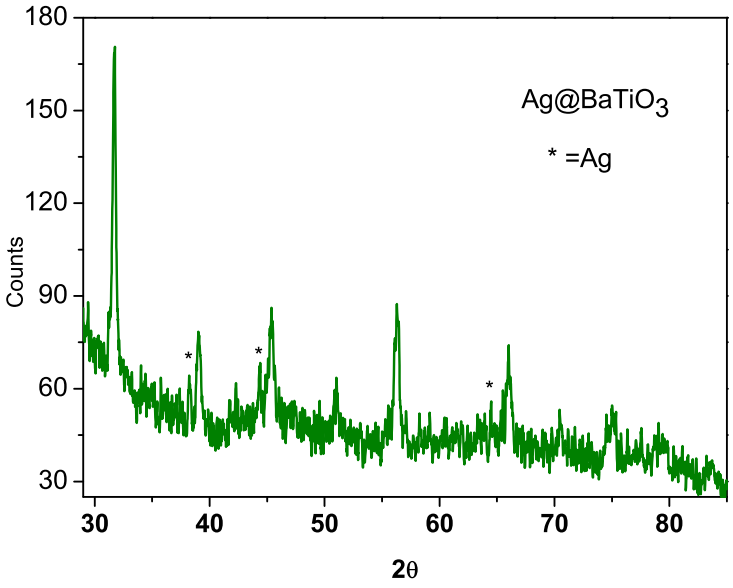

Figure S3. The XRD pattern of the Ag@$BaTiO_3$ particles calcined at 900^{o}C. The peaks due to Ag are depicted with the (*) sign and $BaTiO_3$ were assigned to cubic polymorph.

The XRD pattern shows all the peaks for the $BaTiO_3$, additionally the weak peaks at 38.1, 44.4 and at 64.8 can be assigned to Ag (111),(200) and (220), respectively.

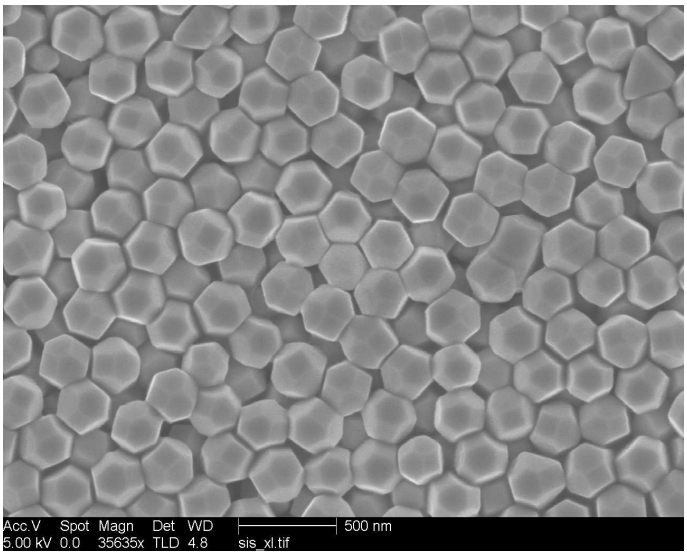

Figure S4. The SEM image of Ag particles used for making Ag@TiO_2 particles and finally Ag@$BaTiO_3$ particles.

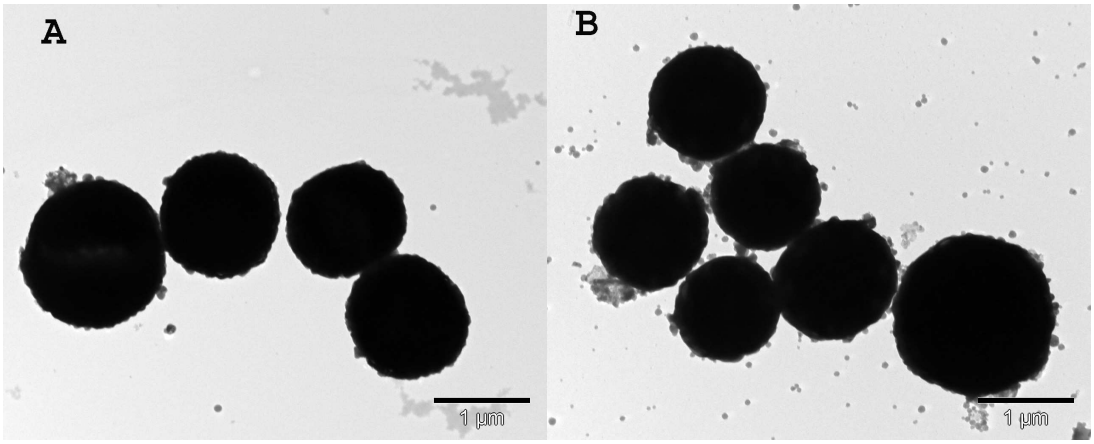

Figure S5. The TEM images of (a) Pr doped $Ca_{0.6}Sr_{0.4}TiO_3$ particles and (b) Pr doped $CaTiO_3$ particles calcined at 900°C.

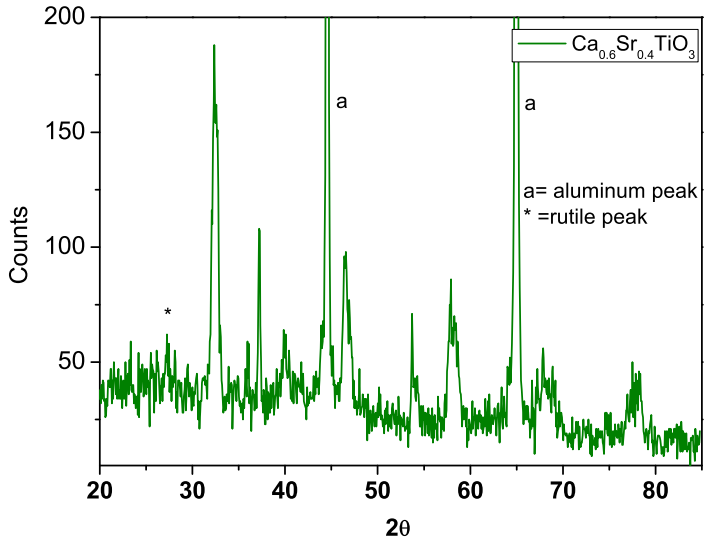

Figure S6. The XRD for Pr doped $Ca_{0.6}Sr_{0.4}TiO_3$ particles. The peaks are broadened due to the overlap of the peaks for pure $CaTiO_3$ and $SrTiO_3$.

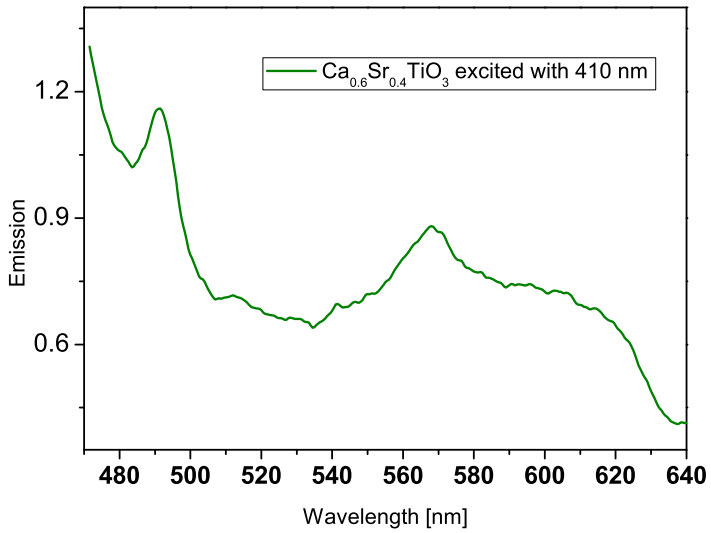

Figure S7. The Emission spectrum for Pr doped $Ca_{0.6}Sr_{0.4}TiO_3$ particles excited with 410 nm, In addition to the peak at 491nm there is also broad peak in red including 613 nm.

For $Ca_xSr_{1-x}TiO_3$ the emission is at 491 nm is already known.[1] For our sample we observed this emission only when excited with 400-480 nm but not at 300-320 nm region. It could be due to lower calcination temperature than 1300^{o}C. There is still emission at 613 nm but very broad, note also that there is another peak at 567 nm.

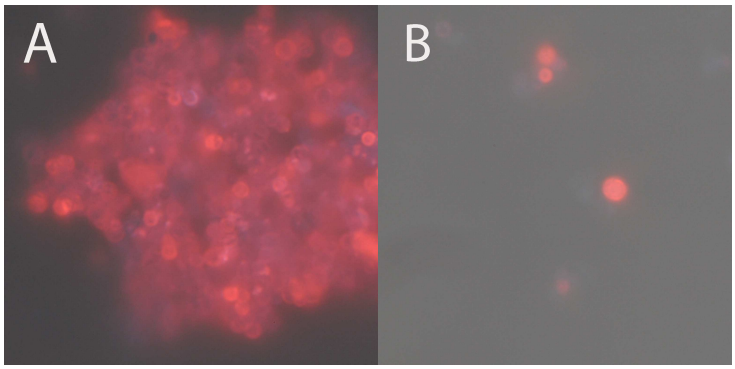

Figure S8. Microscopy images of (a) Pr doped $Ca_{0.6}Sr_{0.4}TiO_3$ and (b) Pr doped $CaTiO_3$ particles illuminated with a Hg lamp filtered with a filter cube exciting within 350-380 nm. The particles were dried on a glass slide for imaging. The red 613 nm emission is directly visible.

[1]Kyomen, T; Sakamoto, R.; Sakamoto, N.; Kunugi, S.; Itoh, M. *Chem. Mater.*, **2005**, *17*, 3200-3204.