Electrical resistivity of assembled transparent inorganic oxide nanoparticle thin layers: Influence of silica, insulating impurities and surfactant layer thickness

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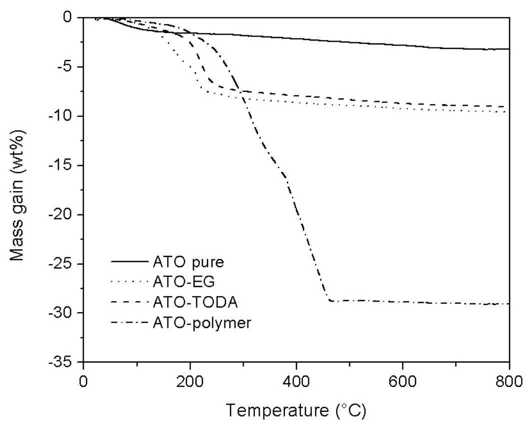
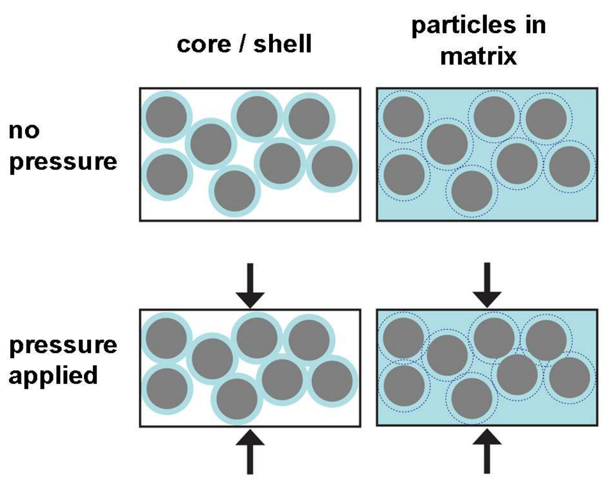
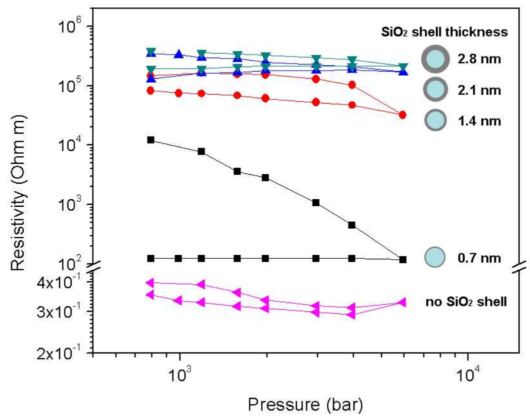


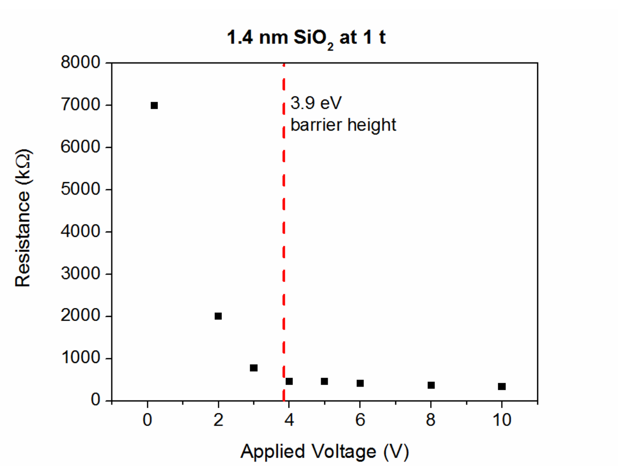
Supporting Figure 1: Thermogravimetrical analysis of organically functionalized ATO nanoparticles (dried state). A mass loss of about 30 wt% is observed for the polymer coated ATO at high temperatures and less than 10 wt% for EG and TODA shells.



Supporting Figure 2: Two models are shown to explain the structure of polymer coated ATO pills. Either a core/shell like structure can be assumed, where the total amount of polymer is coated around the ATO cores, or the composite can be described by a polymer matrix with embedded ATO particles. In the latter structure the mean distance corresponds to two times an imaginary shell thickness.



Supporting Figure 3: Pressure dependent resistivity measurements are shown for ATO coated with different shell thicknesses of SiO_2 and the uncoated SiO_2, prepared on the same FSP-setup.



Supporting Figure 4: The resistance of 1.4 nm SiO_2 coated ATO nanoparticles were measured under 1 t pressure at different applied voltages. A strong decrease in resistance can be observed when the applied voltage is approaching the barrier height, and a nearly constant resistance is observed at voltages exceeding the barrier.