Electronic Supplementary Material (ESI) for Journal of Materials Chemistry C


# Supporting Information to

## Functionalized ZnO nanoparticles for thin-film transistors: Support of ligand removal by non-thermal methods

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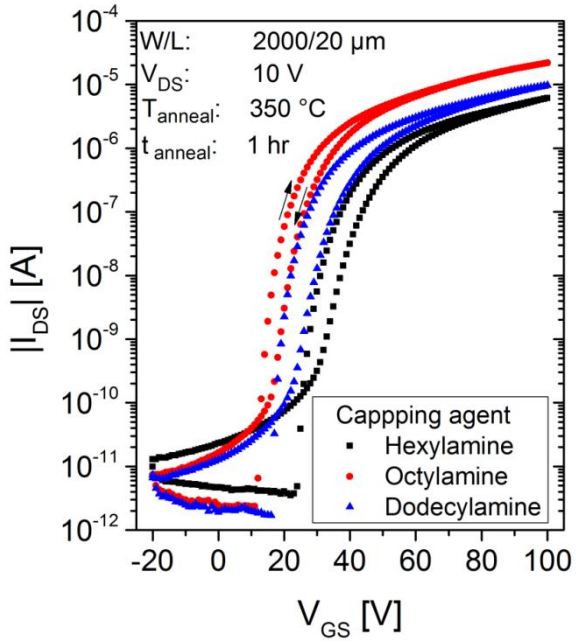
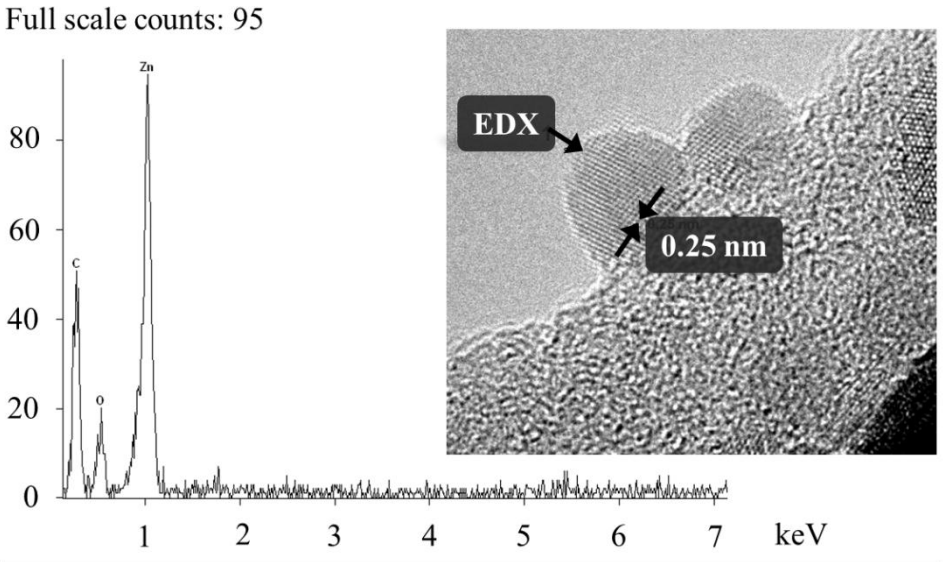



**Fig. S1** Transfer characteristics of ZnO nanoparticles functionalized with different alkylamines, corresponding chain lengths are 6 for 1-hexylamine (■), 8 for 1-octylamine (●) and 12 for 1-dodecylamine (▲). The nanoparticles coated with 1-octylamine lead to the best results and are used for all further experiments.




| Element Line | Net Counts | Weight % | Weight % Error | Atom % | Atom % Error |
|---|---|---|---|---|---|
| O K | 127 | 21.16 | +/- 2.67 | 52.30 | +/- 6.59 |
| Zn K | 955 | 78.84 | +/- 4.54 | 47.70 | +/- 2.75 |
| Total | | 100.00 | | 100.00 | |

**Fig. S2** EDX analysis proves the presence of a carbon species at the particles surface. The spot for EDX analysis as well as the lattice constant of 2.5 Å are indicated in the inset.

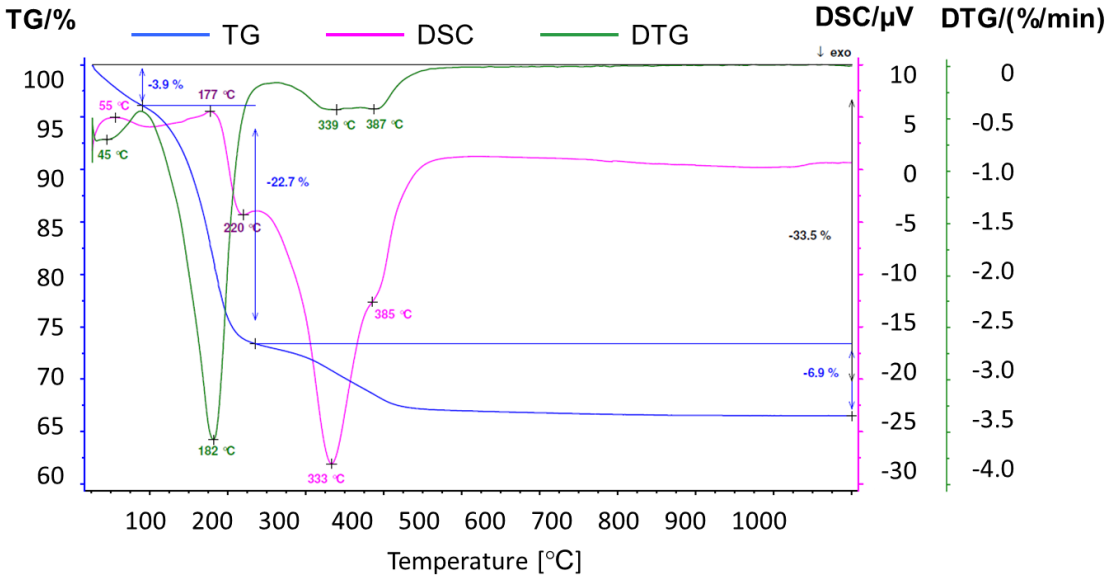



**Fig. S3**: Thermogravimetric analysis of functionalized ZnO nanoparticles. Two characteristic temperature ranges can be detected: An endothermic peak at 182 °C, close to the boiling point of 1-octylamine ($T_b$ = 177 °C), and an exothermic peak at 333 °C. The first is most likely linked to an evaporation of free or loosely bound ligands, the latter to the de-composition of coordinated 1-octylamine on the particles surface.

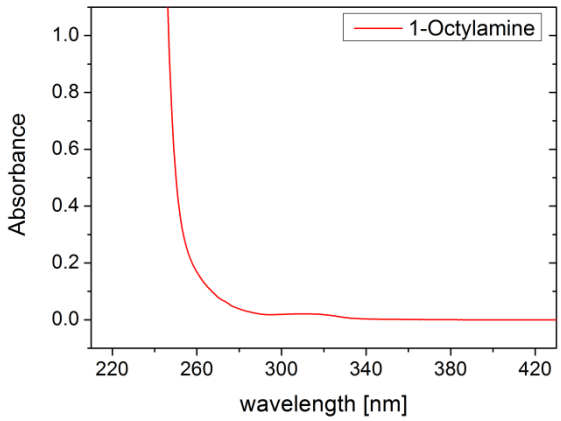



**Fig. S4** UV/Vis spectrum of 1-octylamine, showing the absorbance at wavelengths below 260 nm.

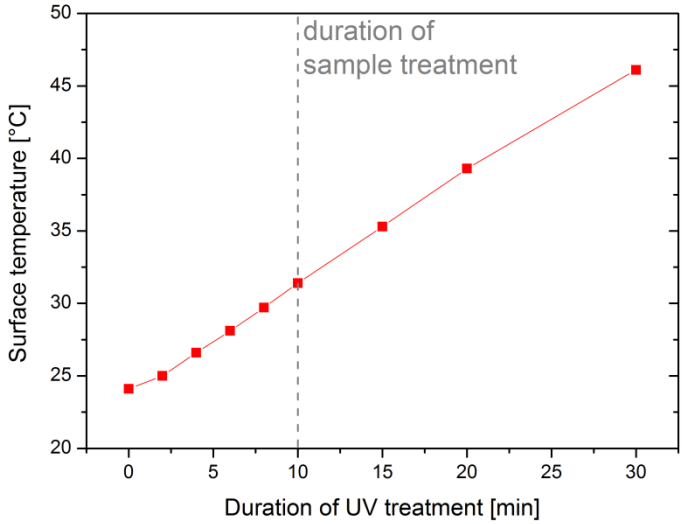



**Fig. S5** Surface temperature of spin coated films of ZnO nanoparticles on $Si/SiO_2$ wafers during the UV treatment.

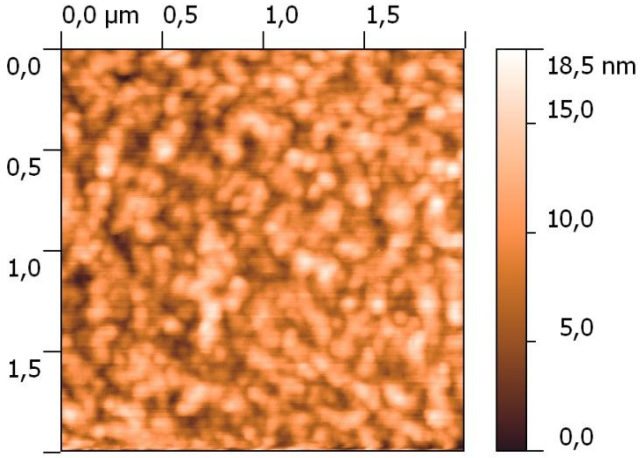



**Fig. S6** AFM image of the surface of the channel area of a TFT. The structure resembles the patterned surface that was also observed by SEM analysis.