Electronic Supplementary Material (ESI) for Physical Chemistry Chemical Physics.

Supporting information

Classical Group Theory adapted to the mechanism of Pt_3Ni nanoparticle growth: the role $W(CO)_6$ as the "shape-controlling" agent

M. Radtke and A. Ignaszak*

* anna.ignaszak@uni-jena.de

Materials

Oleylamine technical grade 70 %, oleic acid (analytical standard), platinum acetylacetonate (97 %), nickel acetylacetonate (95%), tungsten hexacarbonyl (99.9 %), chloroform of purity ≥99 % were purchased from Sigma-Aldrich.

Synthesis of cuboctahedral Pt_3Ni nanoparticles:

Three-neck 25 mL round bottom flask was first charged with 10 mL of (9Z)-Octadecene and cis-Δ9-Octadecenoic acid (1 mL). Subsequently, under counter flow of dry nitrogen 20 mg (0.05 mmol) of $Pt(acac)_2$, 10 mg (0.04 mmol) of $Ni(acac)_2$ were added to the solvent and the reaction flask was heated up to 130°C. The solution was vigorously stirred for 5 minutes and then tungsten hexacarbonyl (50 mg, 1.7 mL $CHCl_3$) was introduced and the temperature was increased in small intervals up to 200 °C over 30 minutes. The reaction was carried out for 30 minutes leading to brown colloidal product.

Synthesis of Pt_3Ni polypods:

Three-neck 25 mL round bottom flask was first charged with 10 mL of (9Z)-Octadecene and cis-Δ9-Octadecenoic acid (1 mL). Subsequently, under counter flow of dry nitrogen 20 mg (0.05 mmol) of $Pt(acac)_2$, 10 mg (0.04 mmol) of $Ni(acac)_2$ were added to the solvent and the reaction flask was heated up to 130°C. The solution was vigorously stirred for 5 minutes and then tungsten hexacarbonyl (50 mg, 1.7 mL $CHCl_3$) was added and the temperature was increased in small intervals up to 230 °C over 45 minutes, and then kept at this temperature for 240 minutes leading to black colloidal product.

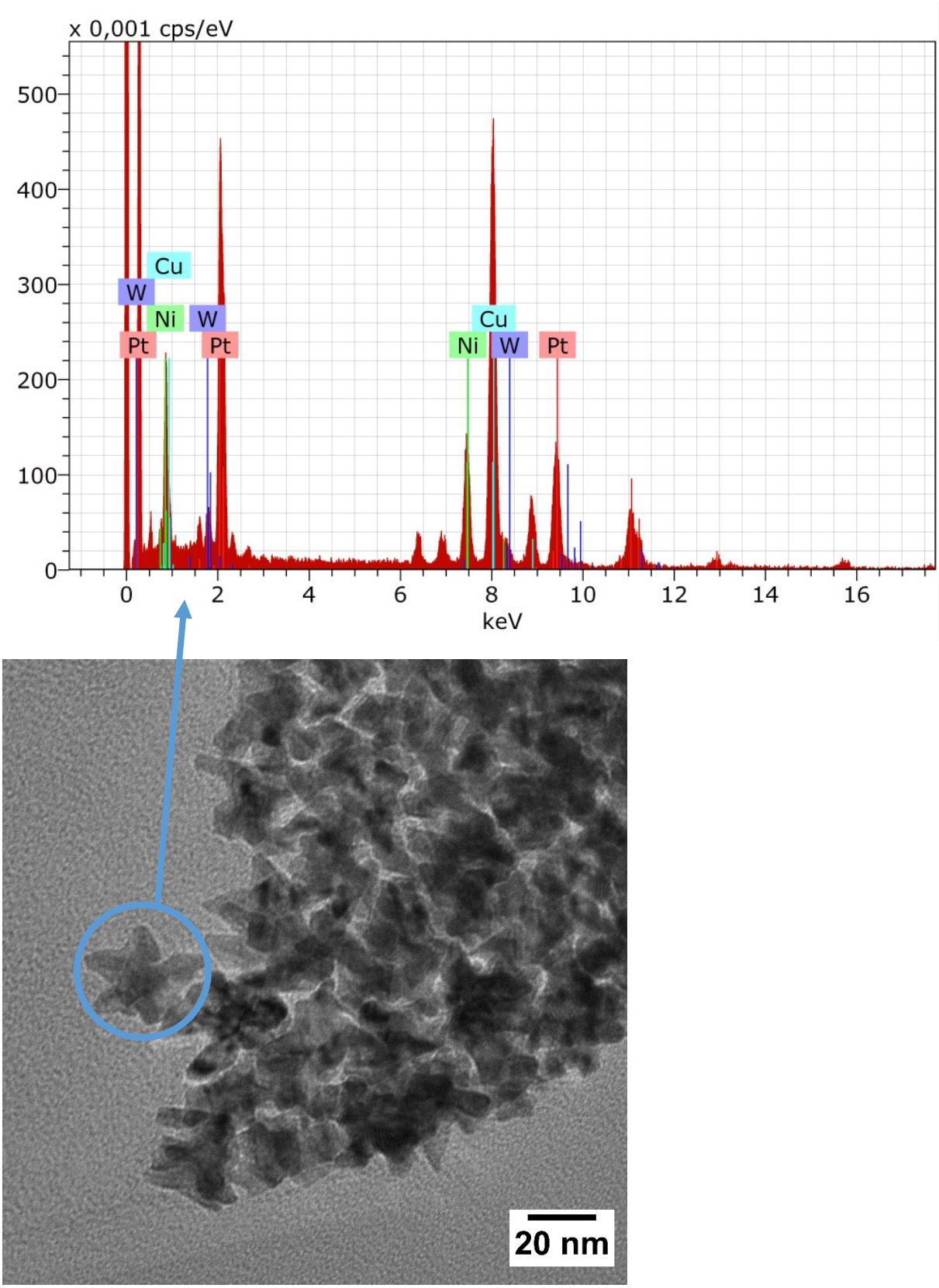

Fig. S1 HR-TEM and spot-resolved EDX elemental mapping of Pt_3Ni nanoparticles.