Experiments

Chemicals and Materials

Chemicals used in the experimental processes were. Nickel (II) acetate tetrahydrate ($Ni(CO_2CH_3)_2.4H_2O$, 98%), copper (I) acetate ($CuCO_2CH_3$, 97%), oleylamine (technical grade, 70%) and 1-octadecan (99%) were used as solvent, reducing agent and stabilizer. Ethanol (98%) was used as a solvent for cleaning purposes and the particles were dispersed with toluene (99%). Only chemicals of analytical grade were used, without any further purification process.

Synthesis of Ni-Cu Nanoparticles

First, 1 mM of 600 µL each Nickel (II) acetate tetrahydrate, copper (I) acetate ($CuCO_2CH_3$, 97%), and oleylamine were heated at 90 °C with rapid magnetic stirring and made solution (A). In the second step, take 10 mL each oleylamine and 1-octadecane were mixed under the N_2-ambient and the mixture was stirred for 20 min. Then solution (A) was added at one time to the mixture. The temperature was then raised to 250 °C and held for 10 min in N_2 atmosphere with rapid magnetic stirring. The resulting colloidal solutions were then cooled to room temperature, precipitated by using ethanol and centrifuging three times at 5000 rpm for 10 minutes. The precipitate was re-dispersed in toluene. The resulting particles were drop-casted onto 3 mm gold grids for their subsequent characterization.