Supporting Information

Solid solution magnetic FeNi nanostrand-polymer composites by connecting-coarsening assembly

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Characterization of FeNi nanoparticles generated by ps-laser ablation in acetone:

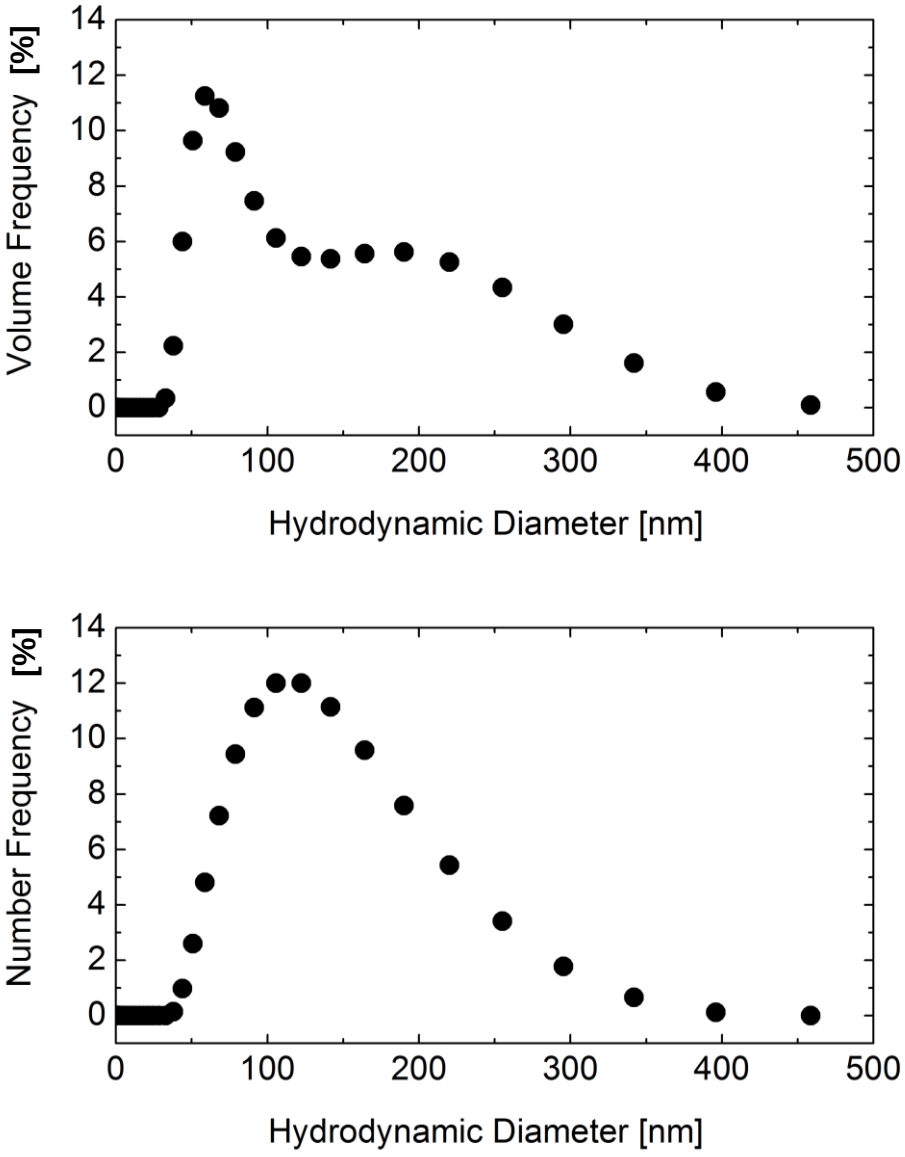

Figure S1: a) Particle volume distribution of ps-laser-generated FeNi nanoparticles b) Particle number distribution of laser-generated FeN nanoparticles as measured by dynamic light scattering. The hydrodynamic diameter is viscosity corrected.

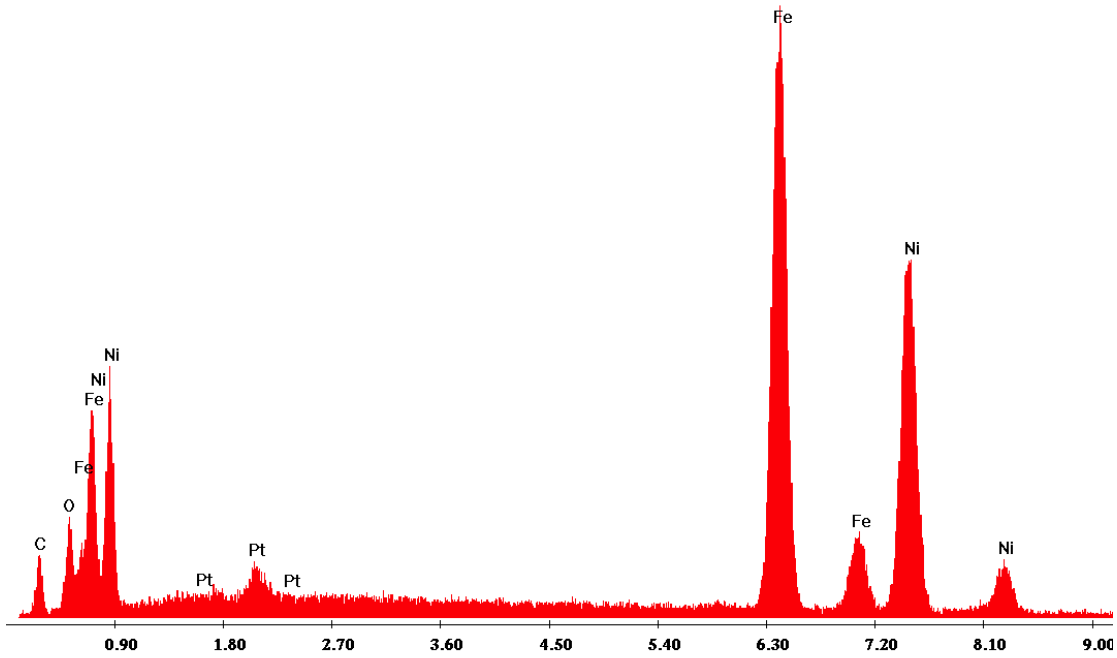

Figure S2: SEM-EDS analysis showing composition of nanoalloys with Fe (49.88wt%, 51.13at%) and Ni (50.12 wt%, 48.87 at%). Note that the platinum peaks in EDS analysis are due to the coating material used in the SEM analysis

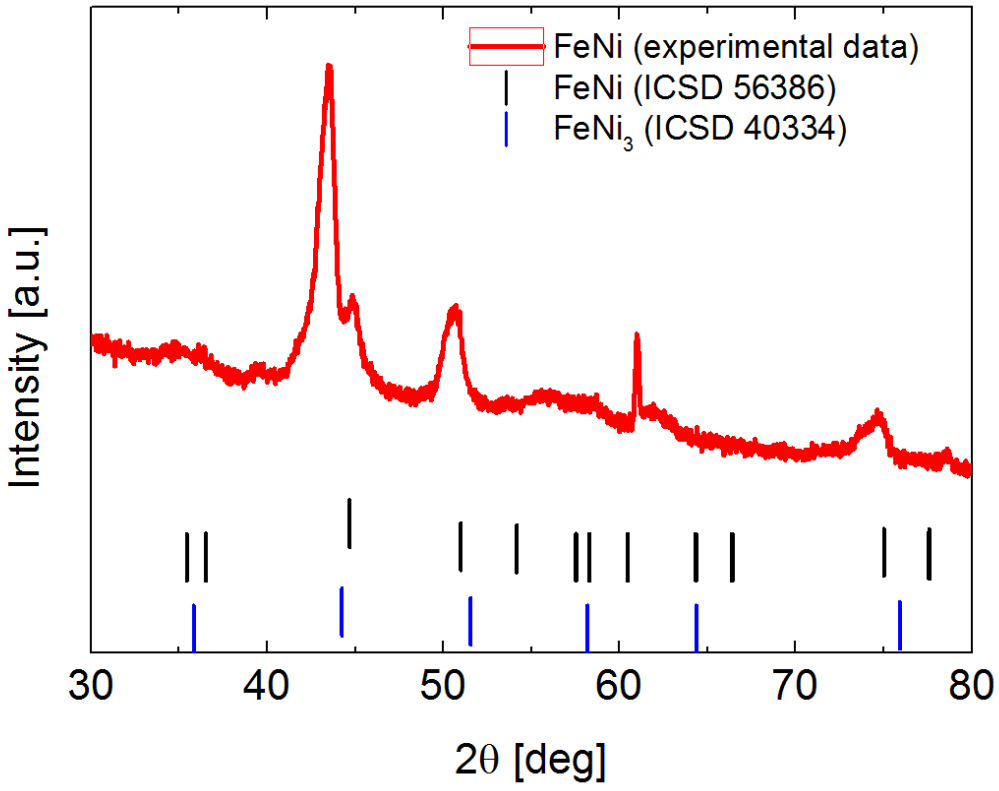

Figure S3: XRD pattern of the products during laser ablation of a FeNi target in acetone. Main phases consist of the hexagonal structure of FeNi and the cubic structure of $FeNi_3$.

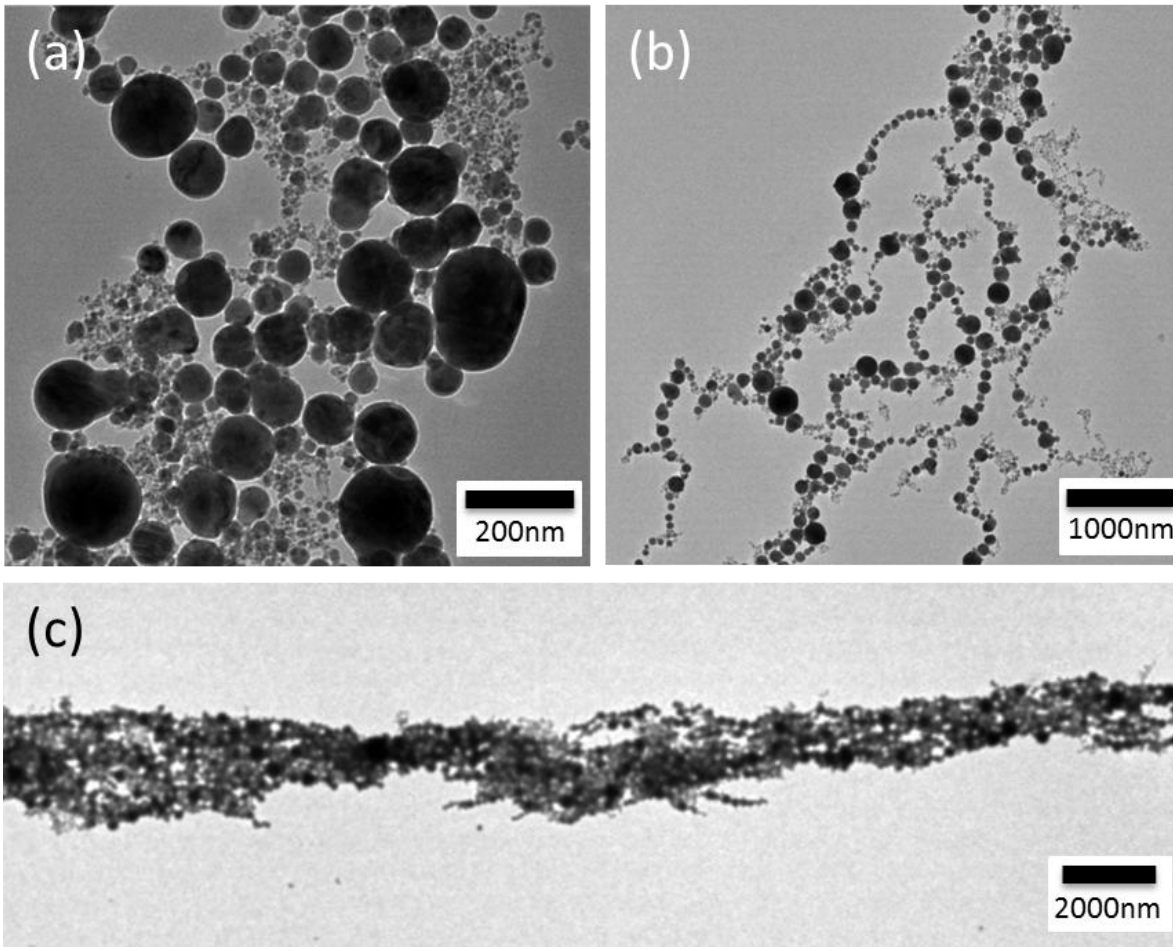

Figure S4: TEM images showing the FeNi nanoparticles (0.4wt%) (a,b) without and (c) with and external magnetic field.

Control experiments:

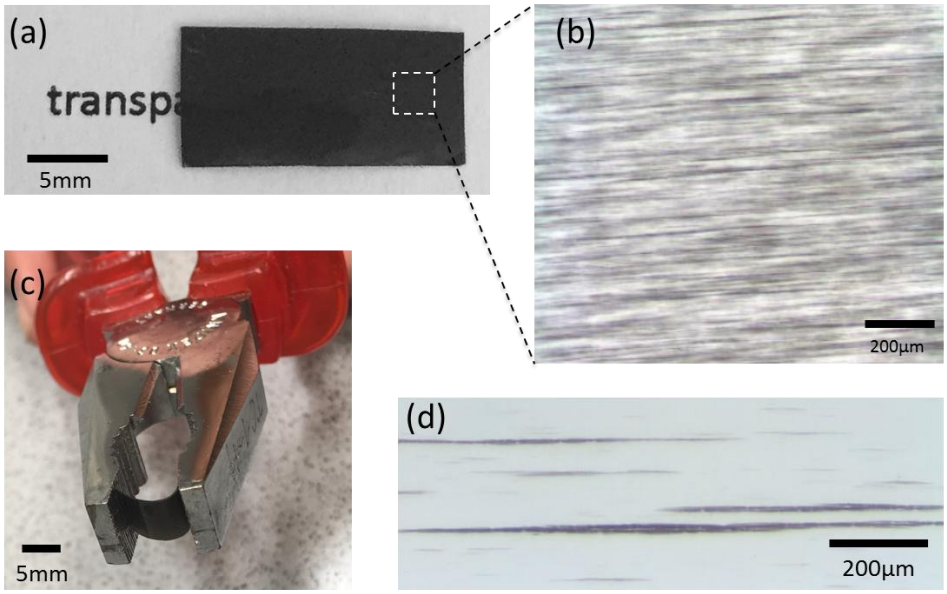

Figure S5: a) Photograph and b) optical microscopy image of nanocomposites with a FeNi-filling factor of 1wt%, c) picture showing flexibility of a 500µm thick composite, d) optical microscopy image of a 1.1mm long nanostrand during the formation of the nanocomposite shown in a).

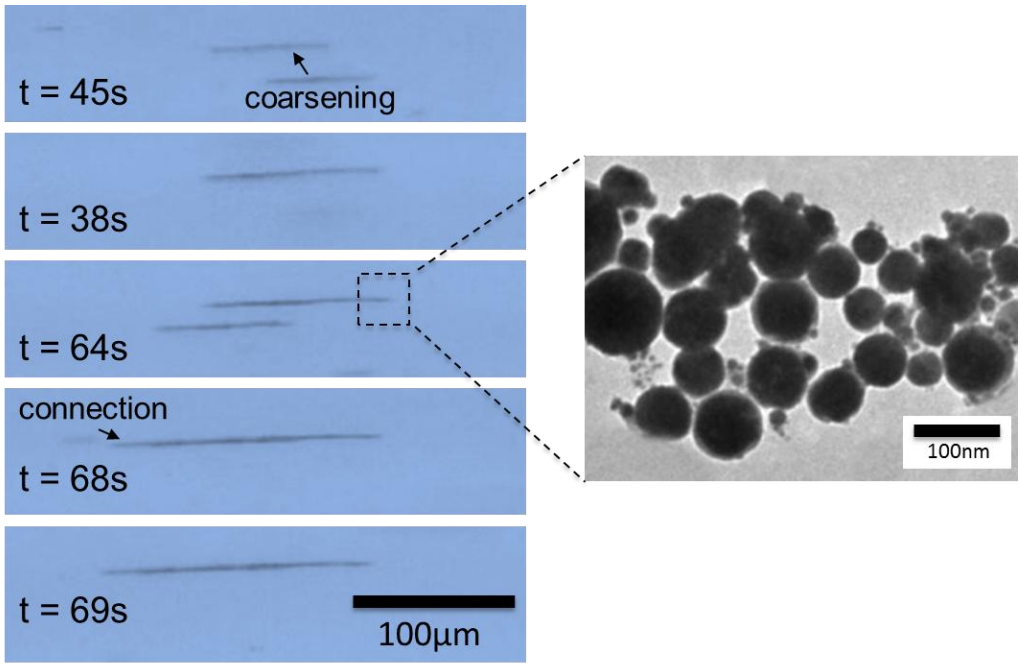

Figure S6: Left: Assembly of a ~200µm long AuFe nanostrand by connection and coarsening mechanism as captured by videography (see video in ESI). Images at times in the magnetic field t = 45 s, 38 s, 64 s, 68 s and 69 s are shown for a nanoparticle filling factor of 0.4 wt%. Right: TEM image of an AuFe nanostrand. The composition of the laser ablated AuFe alloy target is 50:50.

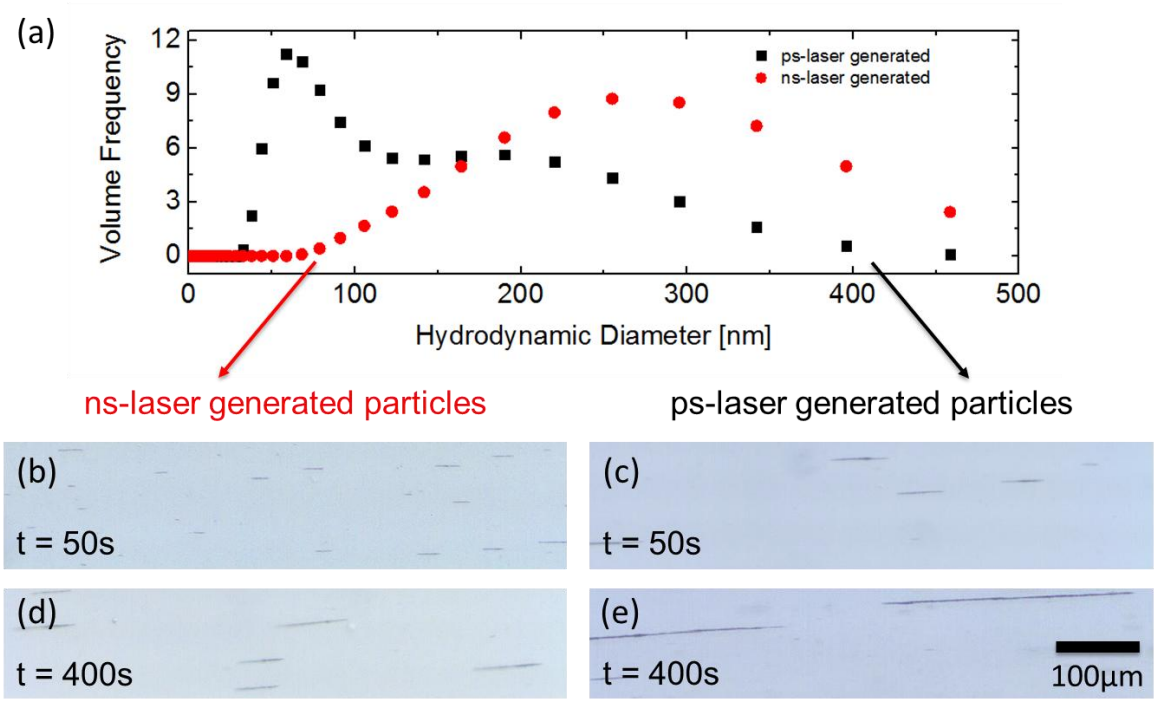

Figure S7: a) Particle volume distribution of picosecond- and nanosecond-laser-generated FeNi nanoparticles as measured by dynamic light scattering b), d) nanostrands at times 50s and 400s in an external magnetic field for nanosecond laser generated particles c), e) nanostrands at times 50s and 400s in an external magnetic field for picosecond laser generated particles. The filling factor is 0.1wt% in both cases.

For video, showing the formation of a nanostrand see 10.1039/c5tc02160j