Removal of Synthetic Azo Dye using Bimetallic Nickel-Iron Nanoparticles[1]

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Supplemental Information

Table S1: ICP results for nickel to iron molar ratio for fresh nanoparticles and stored nanoparticles over a span of 3 weeks for both core shell (CS) and alloy morphologies.

0 Weeks			**1 Week**		
Target Ratio	**CS**	**Alloy**	**Target Ratio**	**CS**	**Alloy**
1:1	0.57	1.06	**1:1**	0.61	1.15
0.5:1	0.40	0.54	**0.5:1**	0.43	0.57
0.2:1	0.09	0.20	**0.2:1**	0.11	0.23
2 Weeks			**3 Weeks**		
Target Ratio	**CS**	**Alloy**	**Target Ratio**	**CS**	**Alloy**
1:1	0.51	1.11	**1:1**	0.92	1.10
0.5:1	0.38	0.59	**0.5:1**	0.40	0.55
0.2:1	0.19	0.23	**0.2:1**	0.16	0.21

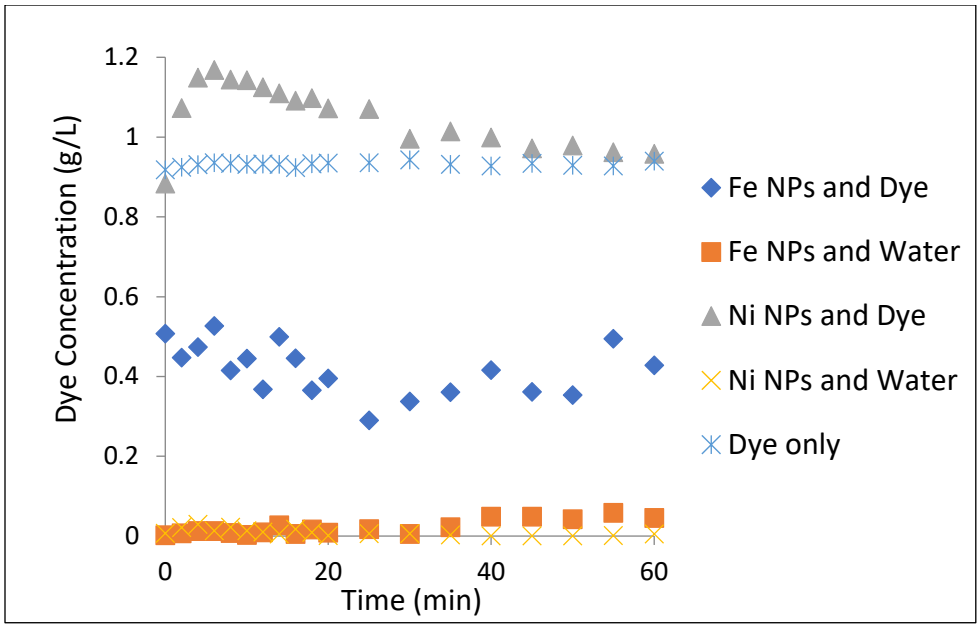

Figure S2: Effect of monometallic iron and nickel nanoparticles over time in water and in a 1 g/L stock dye solution.

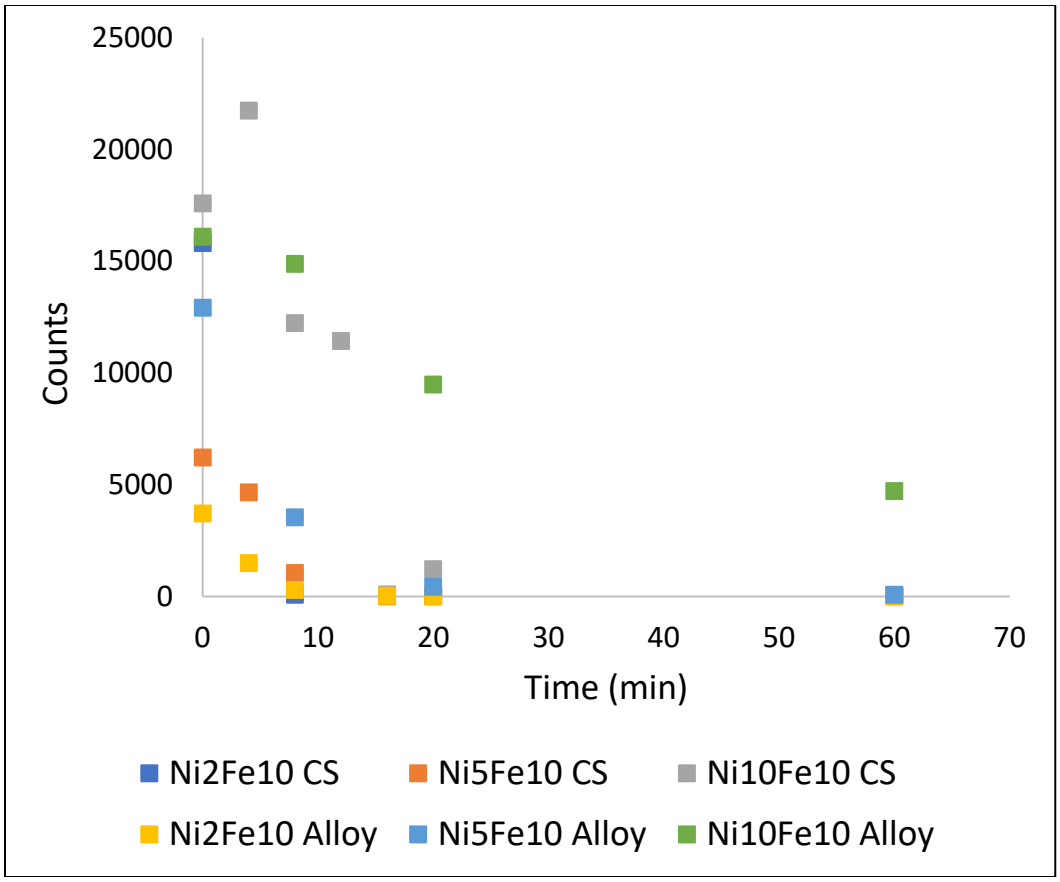

Figure S3. Mass spec detection of Orange G over time for all NiFe morphologies (alloy and core shell) and molar ratios (2:10, 5:10, and 10:10 NiFe).

Table S2. Investigation of Orange G degradation percent from mass spec data as compared to color removal from UV-vis spectrophotometry

Nanoparticles	Orange G Degradation (%)*	Orange G Removal (%)**
Ni_2Fe_{10} CS	99.6	66.3
Ni_5Fe_{10} CS	99.9	89.4
$Ni_{10}Fe_{10}$ CS	99.6	98.3
Ni_2Fe_{10} Alloy	99.9	97.0
Ni_5Fe_{10} Alloy	99.4	99.4
$Ni_{10}Fe_{10}$ Alloy	70.7	98.1

*Mass spec
**UV-vis data

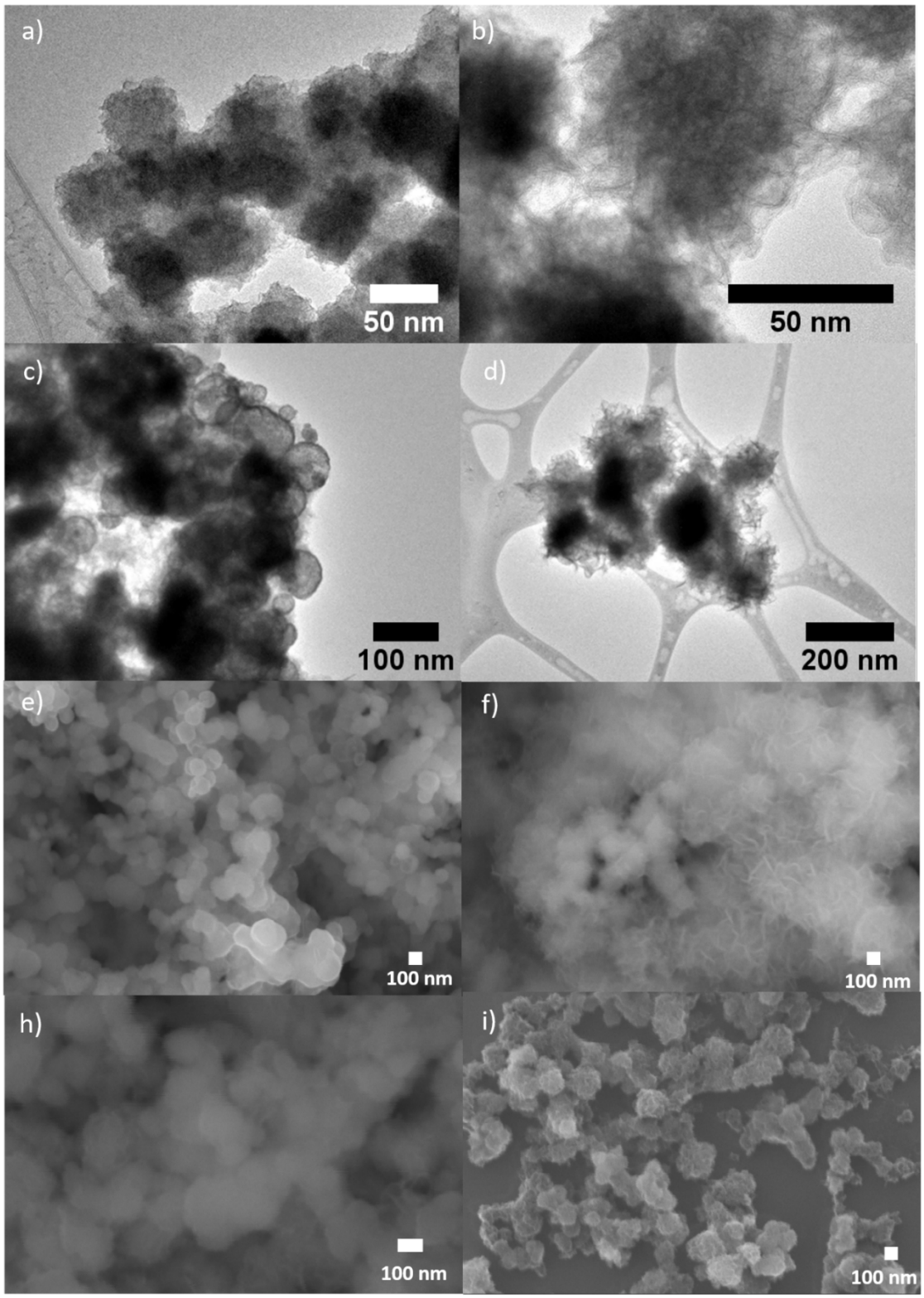

Figure S4. TEM images of core shell nanoparticles a) Ni_5Fe_{10} before testing, b) Ni_5Fe_{10} after testing, c) $Ni_{10}Fe_{10}$ before testing, and d) $Ni_{10}Fe_{10}$ after testing. SEM images of alloy nanoparticles e) Ni_5Fe_{10} before testing, f) Ni_5Fe_{10} after testing, g) $Ni_{10}Fe_{10}$ before testing, and h) $Ni_{10}Fe_{10}$ after testing.

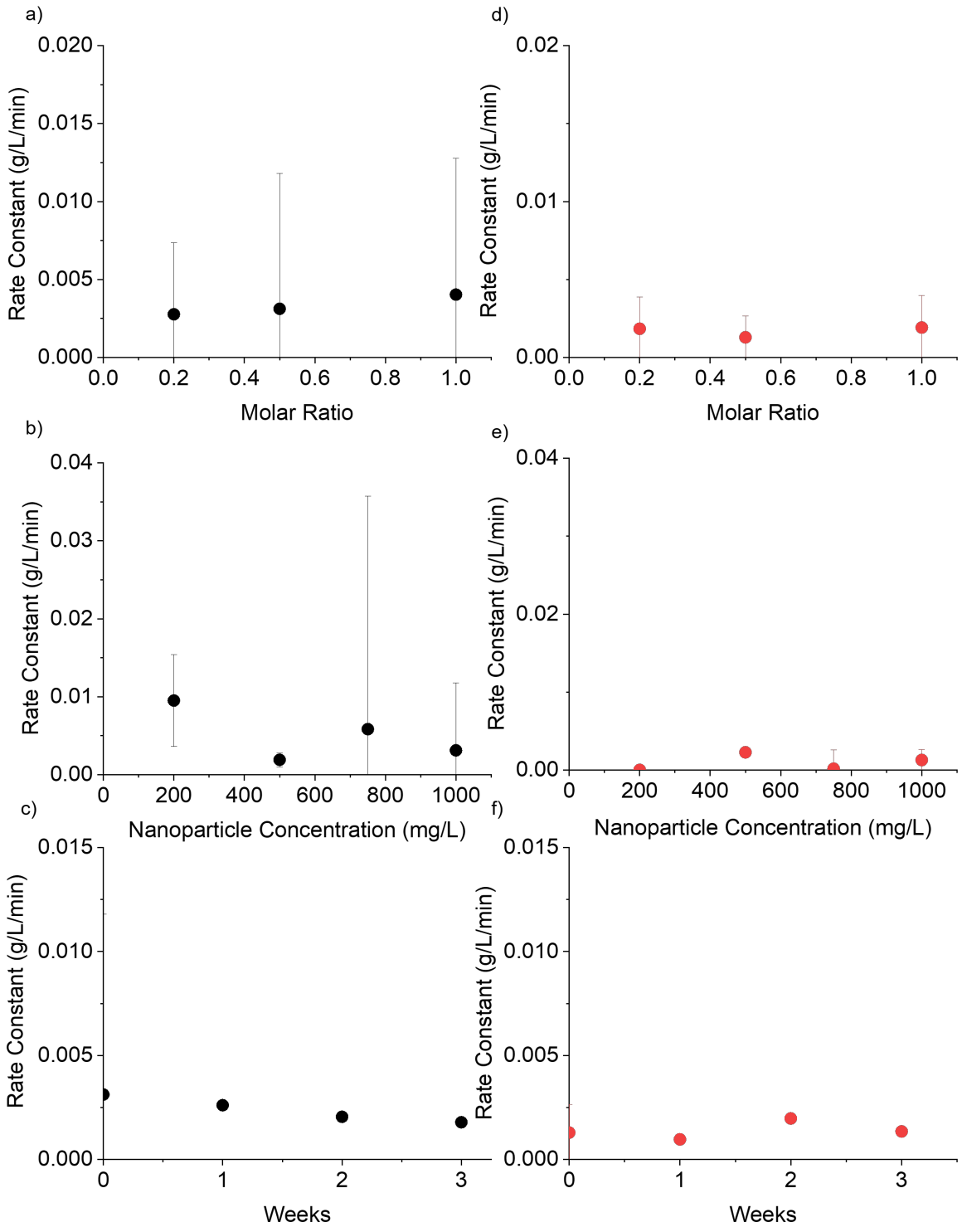

Figure S5: Zero order kinetic rate constants for 1000 mg/L alloy particles comparing a) molar ratio, b) particle concentration, and c) reactive shelf life of Ni_5Fe_{10} alloy particles over the last 40 minutes of experiments. Zero order kinetic rate constants for 1000 mg/L core shell particles comparing d) molar ratio, e) particle concentration, and f) reactive shelf life of Ni_5Fe_{10} coreshell particles over the last 40 minutes of experiments.