

Selective Hydrothermal Reductions Using Geomimicry

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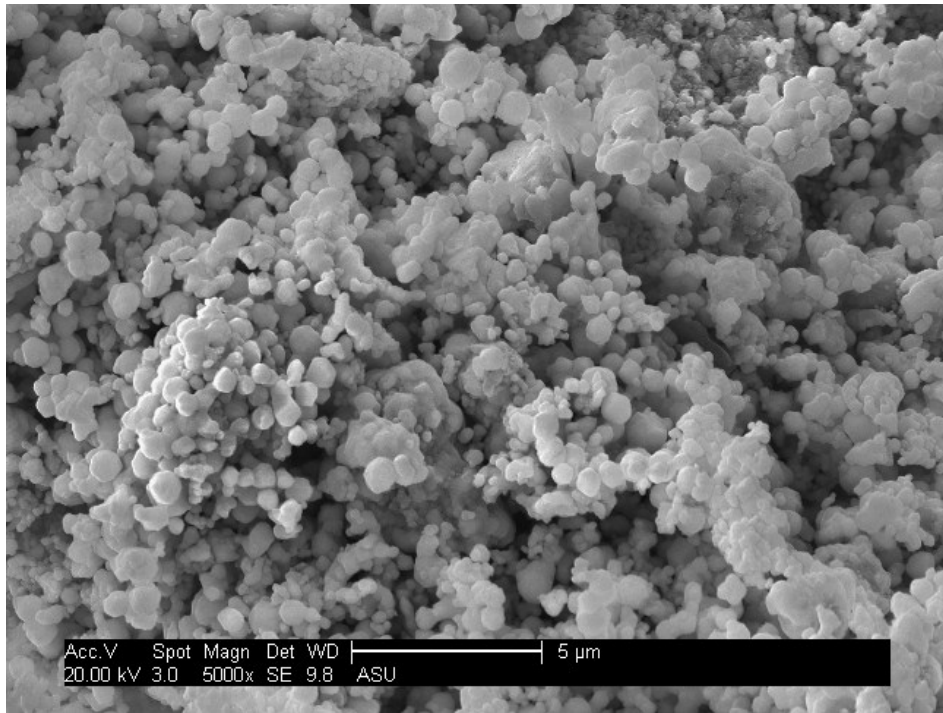
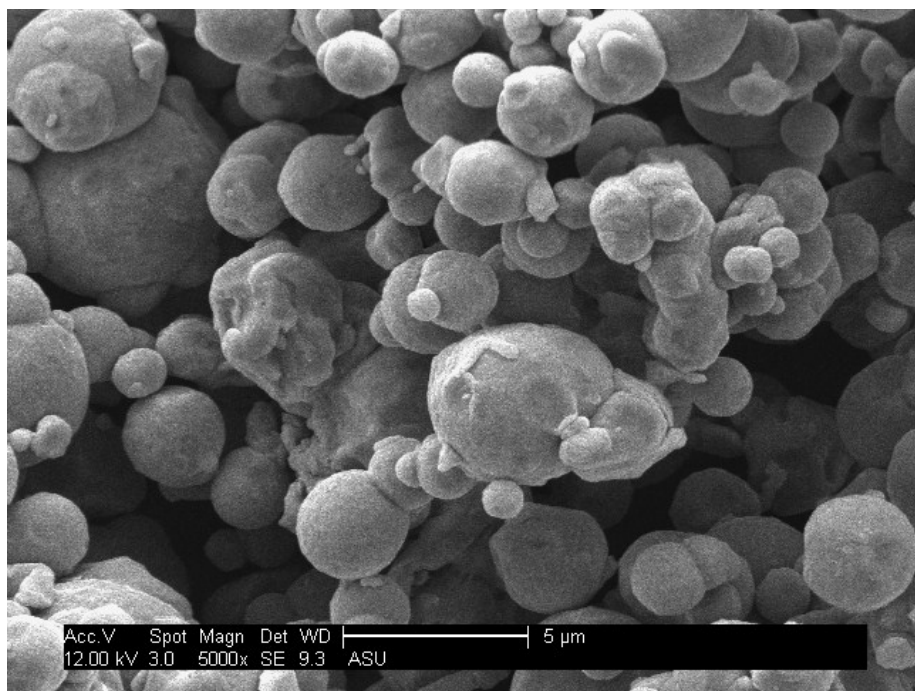


Figure 1. SEM image of the nickel nanopowder.



Acc.V	Spot	Magn	Det	WD	5 μm
12.00 kV	3.0	5000x	SE	9.3 ASU	

Figure 2. SEM image of the iron nanopowder.

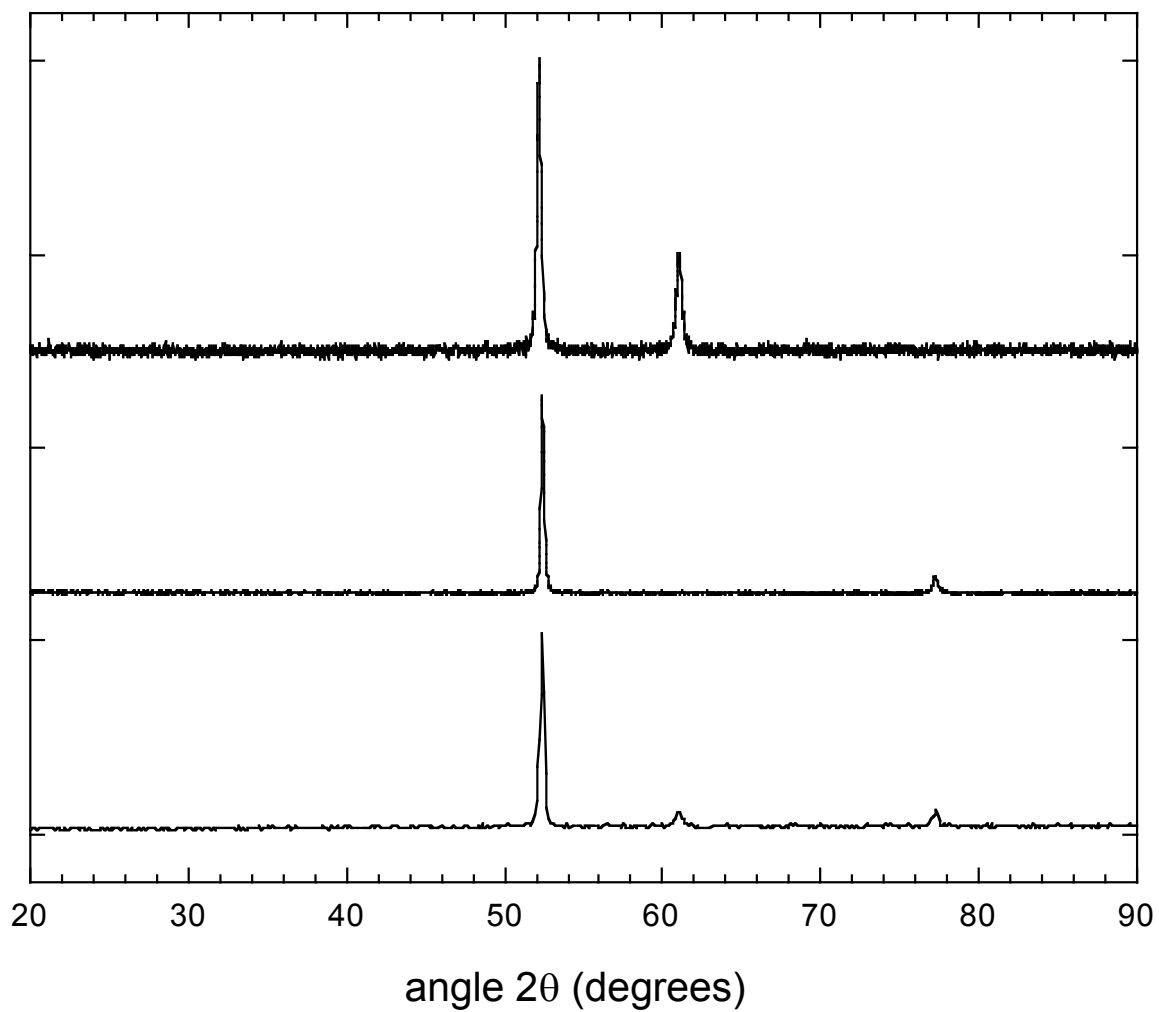


Figure 3. XRD patterns using Co- $k\alpha$ radiation for (top trace), the unreacted nickel powder, (middle trace) the unreacted iron powder, and (bottom trace), a mixture of the nickel and the iron powders as used in the experiments before reaction.

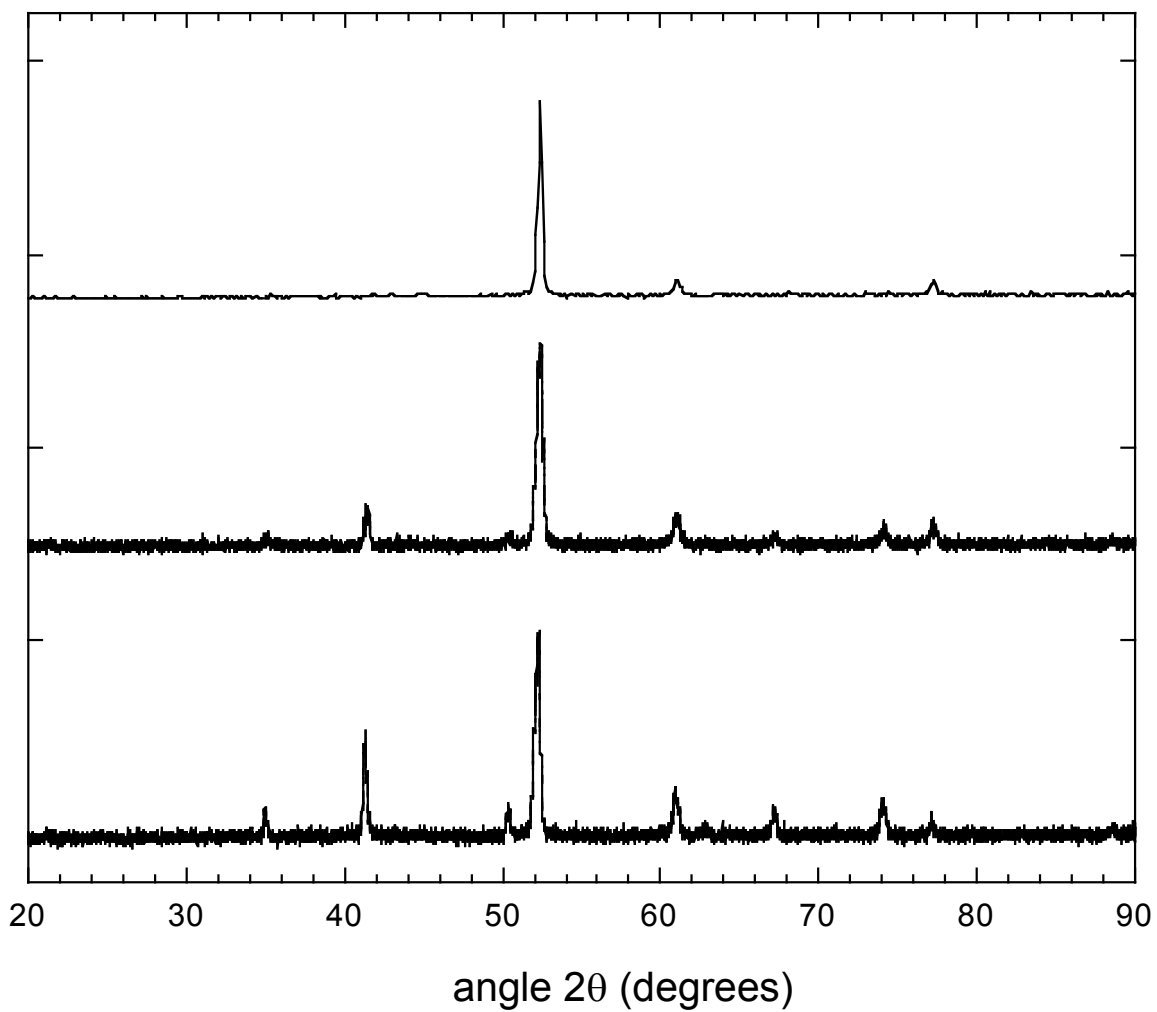


Figure 4. XRD patterns using Co- $k\alpha$ radiation for (top trace), the unreacted nickel and iron powder mixture, (middle trace) the solid products of the nickel and iron powder mixture after reaction for 1 hour at 250°C, nickel and iron, and (bottom trace), the solid products of the nickel and iron powder mixture after reaction for 68 hours at 250°C.

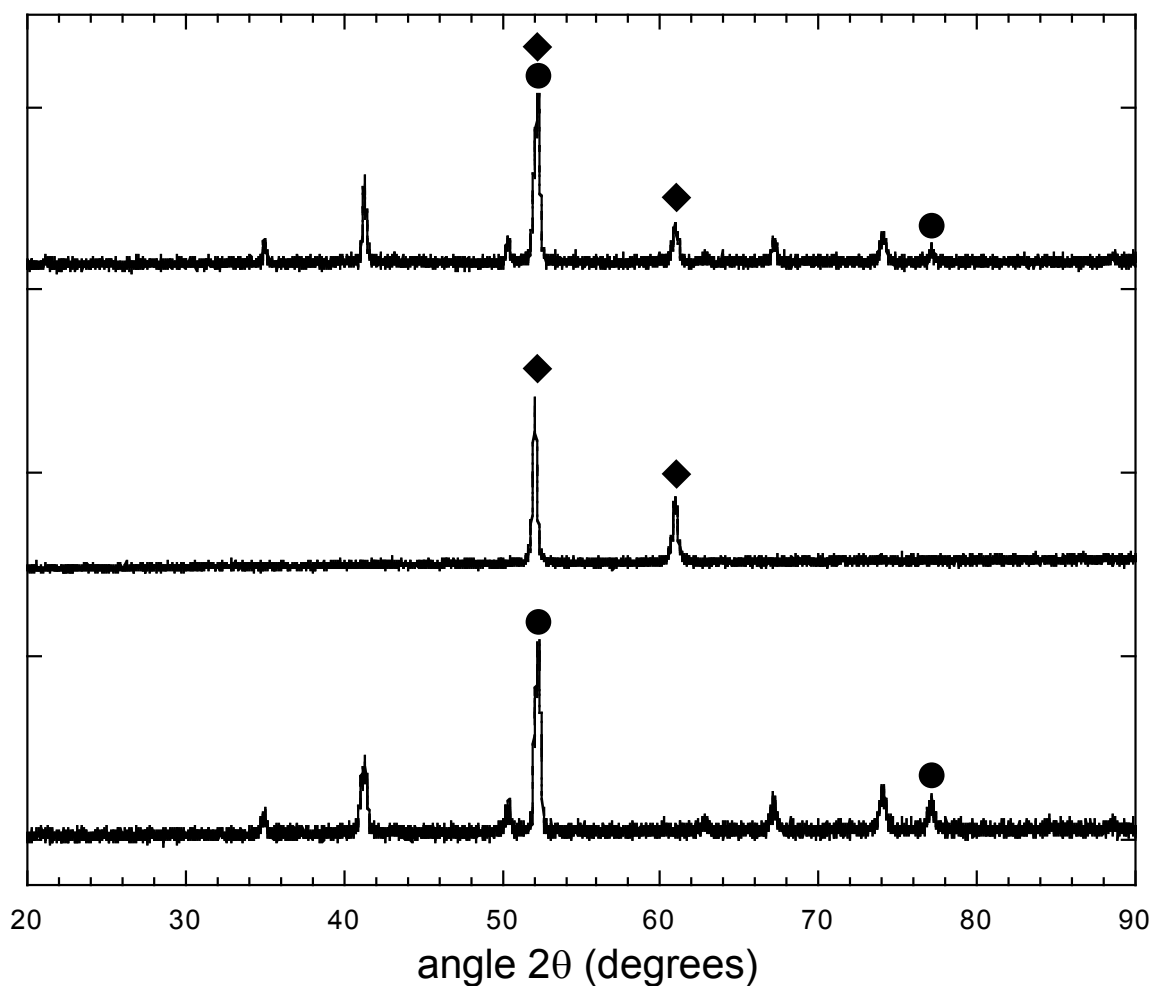


Figure 5. XRD patterns using Co- $k\alpha$ radiation for (top trace), the solid products of reaction of nickel and iron for 68 hours at 250°C, (middle trace) the solid products of reaction of nickel alone for 68 hours at 250°C, and (bottom trace), the solid products of reaction of iron alone for 68 hours at 250°C. The peaks indicated with the diamonds are associated with metallic nickel and the peaks indicated with the solid circles are associated with metallic iron.

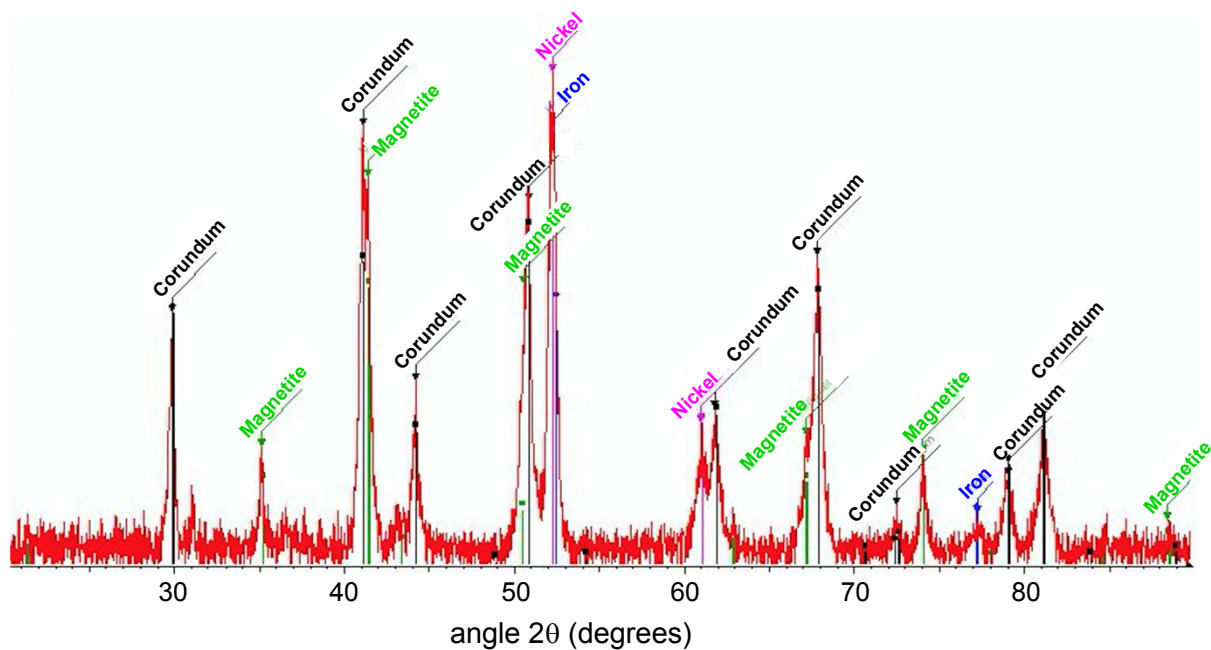


Figure 6. XRD pattern using Co- $k\alpha$ radiation for the products of reaction of nickel and iron at 250°C and 40 bar for 40 hours, and peak assignments obtained using the EVA interpretative software. The products contain a mixture of unreacted nickel, some unreacted iron, corundum from the milling process, and magnetite oxidation product. The reaction products were milled to ca. 20 μm grain size in the presence of corundum, which is the reason for the corundum peaks observed in the XRD pattern. The milling procedure was similar to that described in: Srodoi, J., Drits, V. A., McCarty, D. K., Hsieh, J. C. C., Eberl, D. D. Quantitative X-Ray Diffraction Analysis of Clay-Bearing Rocks From Random Preparations. *Clays and Clay Minerals*, **2001**, 49, 514-528.