Small world: bigger is not better!
Conversion of Steel Mill Waste into Zero Valent NanoFe (ZVnI) Particles

• ‘Green’ Hydrogen for Fuel Cells
• Arsenic Removal from Drinking Water

As-received steel waste
Converted to nano iron ~5 nm
Strong magnetism in nano Fe

H₂O with 500 ppb arsenic
Stir with ~ 1 g of nano Fe
H₂O with 3 ppb arsenic
Desulfurizers for Aviation Fuels

Nanoporous Sulfur Sorbent

Graph showing the time (h) versus H₂S concentration (ppm) for different samples (C1, D1, C2, D2, C3, D3).
Nanocatalysts for Aviation Fuels

Graph showing the H₂ yield (%) over time (h) for different samples labeled R1T, R1T1, R1T2, and R1T3. The graph includes two inset images of the nanocatalysts at different magnifications.
Utilization Not Sequestration: A Novel Paradigm in Greenhouse Gas Mitigation
Functional Nanofibers
Developing Sensors for Noxious Gases — Smart way!

- Exotic Surface Structure
- Higher Sensitivity
- Shorter Response Time

**Images:**
- Tungsten foil
- TiO₂ on titanium plate
- Sintered pellet of TiO₂
- Tungsten after oxidation
- TiO₂ on titanium wire
- TiO₂ after smart reduction
Studies on Maghemite-derived Ferrites

Hi resolution SEM images of m-NiFe$_2$O$_4$

Hi resolution SEM images of m-ZnFe$_2$O$_4$
Facile Synthesis of ZnO Nanorods

Free-standing crystals: 4h

Growth on Au-coated Al₂O₃: 4h