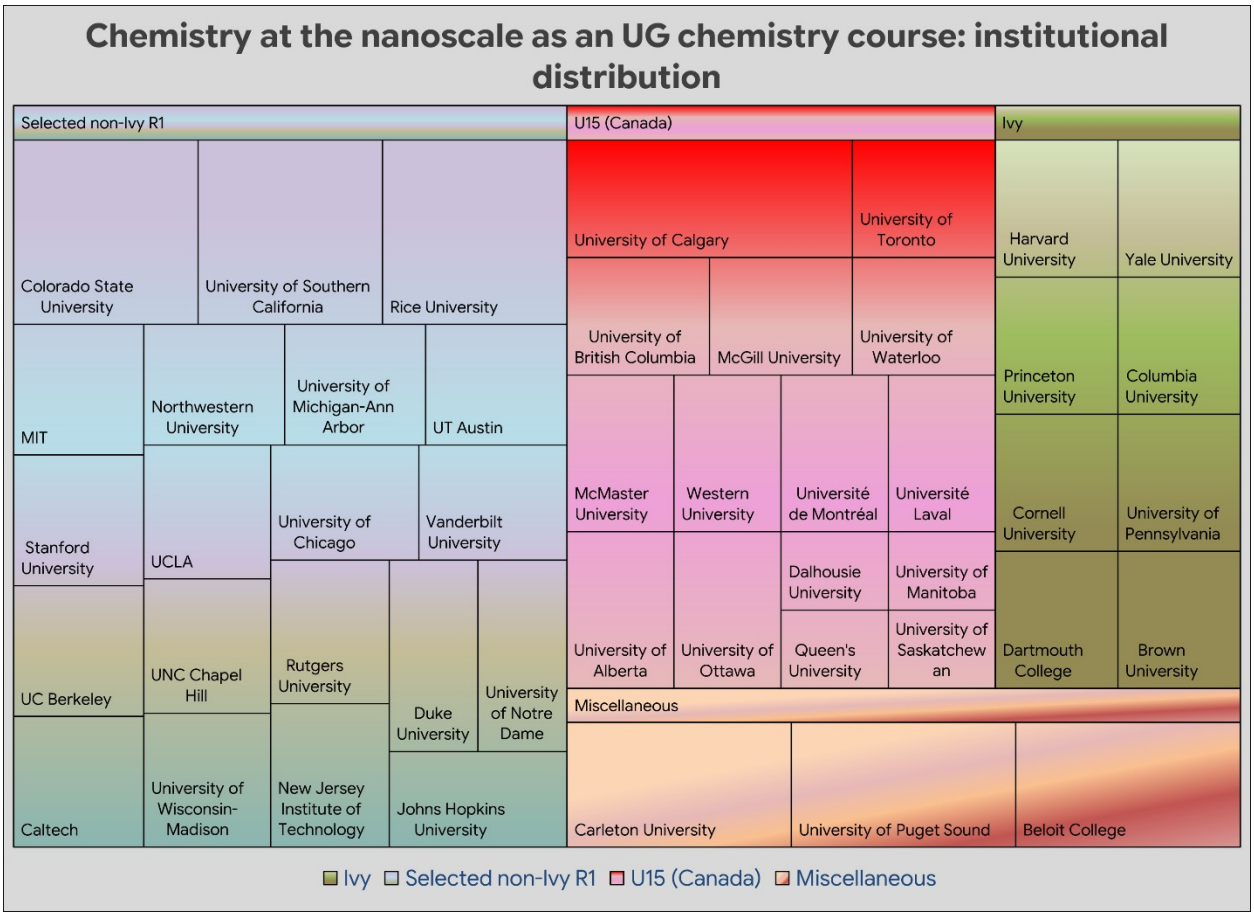


Figure S1

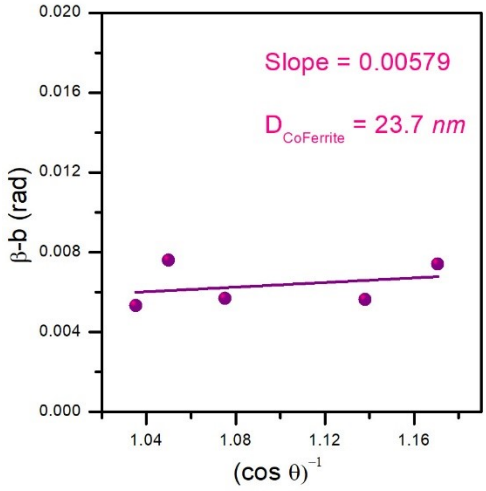


Figure S2

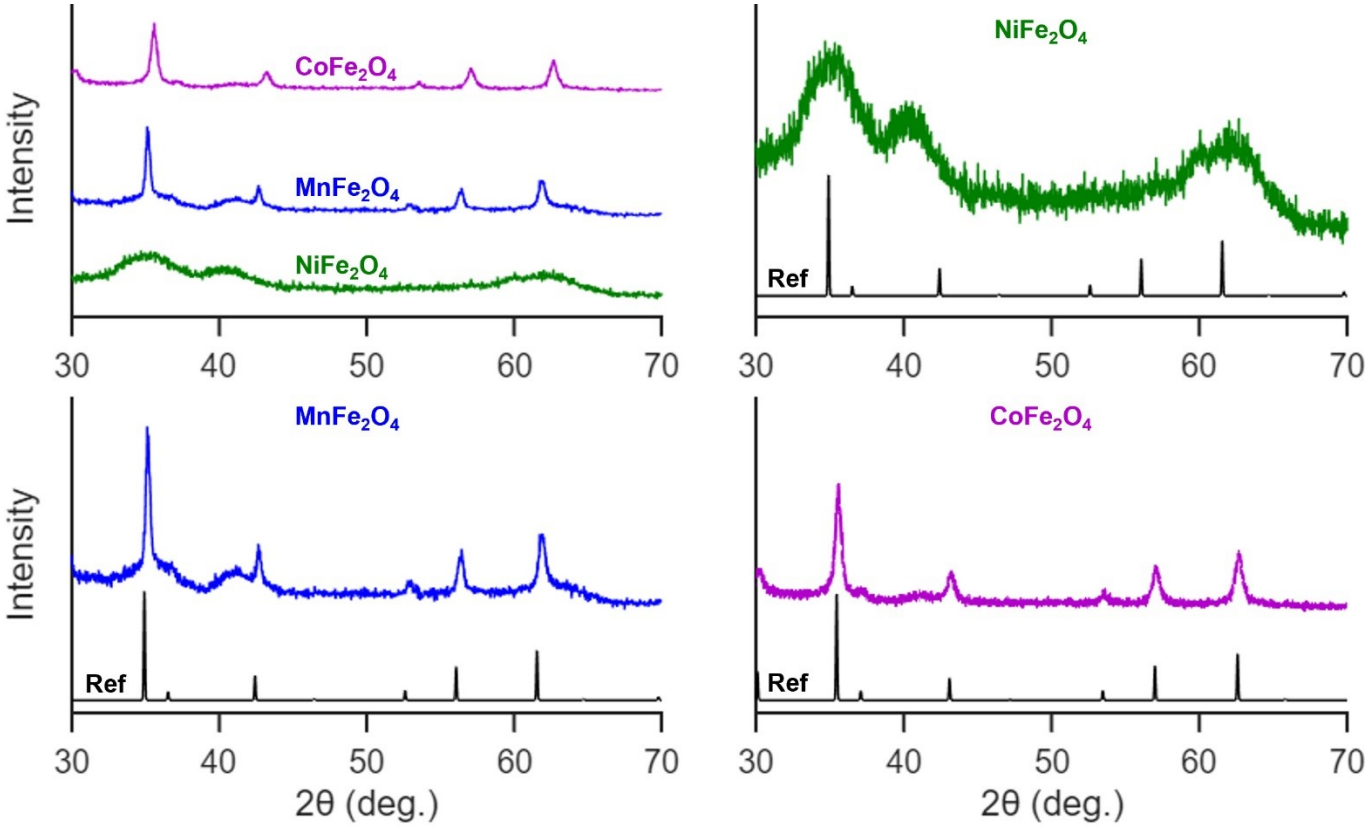


Figure S3

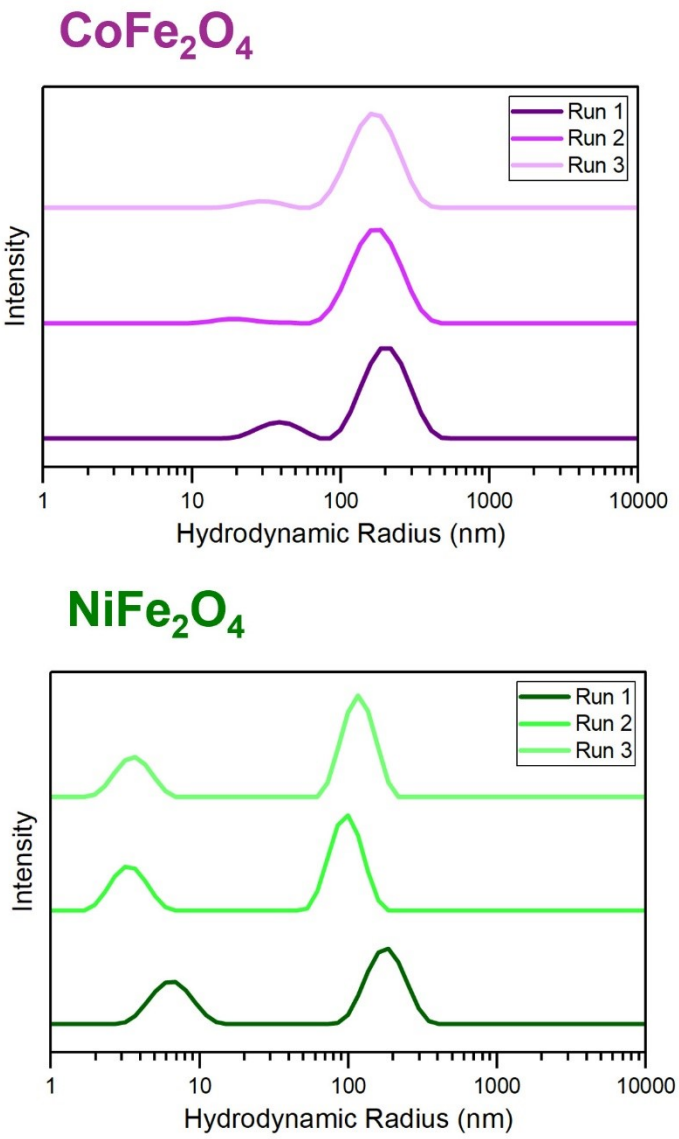
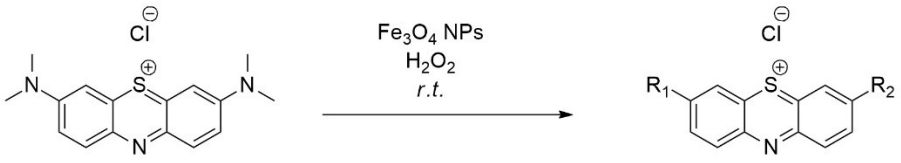

CoFe2O4
Run 1
Run 2
Run 3
Intensity
1
10
100
1000
10000
Hydrodynamic Radius (nm)
NiFe2O4
Run 1
Run 2
Run 3
Intensity
1
10
100
1000
10000
Hydrodynamic Radius (nm)

Figure S4

Segment	LLM Prompt	AI Claim/Output	Validation Source	Result/Reflection
Synthesis	Why do we obtain amorphous $NiFe_2O_4$ NPs, while the other ferrites show crystallinity? Is there a way to increase the crystallinity of $NiFe_2O_4$ NPs?	Nickel ferrite often needs higher thermal energy or longer aging to crystallize than manganese and cobalt ferrites; heating in a furnace at high temperatures (>450°C) can help increase crystallinity.	Cherpin *et al.*, *Materials*, **2021**, *14*(10), 2557. https://doi.org/10.3390/ma14102557	**Verified:** Crucial for understanding the diffractogram of $NiFe_2O_4$ NPs and catalytic performance comparison.
PXRD	Which is a common PXRD peak for all these ferrites?	The peak at 2θ=35.4°; Miller index **(311)**	COD Database / Mercury™	**Verified:** Matched experimental diffractogram peak at ~35°.
Application	Suggest two ways in which the MMFNP catalyzed Fenton-like oxidation of dyes in wastewater may be implemented at scale in a real-life scenario.	An industrial water treatment plant would use a reactor exposed to sunlight when possible, with back-up industrial UV-LEDs. The reaction would be done under continuous flow conditions.	This paper demonstrates a continuous 65-day operation in a secondary effluent plant, calculating a cost of **USD per ton** of water. Wang *et al.*, *Appl. Sci.* **2025**, *15*, 8210. https://doi.org/10.3390/app15158210	**Inconclusive:** No way to implement these recommendations within a teaching laboratory setup.

Figure S5



Thionine: $R_1 = R_2 = -NH_2$
Azure C: $R_1 = -NHMe$; $R_2 = -NH_2$
Azure A: $R_1 = -NMe_2$; $R_2 = -NH_2$
Azure B: $R_1 = -NHMe$; $R_2 = -NMe_2$
$R_1 = -NH_2$; $R_2 = -OH$
$R_1 = -NHMe$; $R_2 = -OH$
$R_1 = R_2 = -NHMe$
$R_1 = -NMe_2$; $R_2 = -OH$
$R_1 = R_2 = -OH$
$R_1 = -N(CHO)_2$; $-R_2 = =NH_2^+$
$R_1 = -NH(CHO)$; $-R_2 = =NH_2^+$
$R_1 = -N(CH_2OH)(CHO)$; $-R_2 = =NH_2^+$

Figure S6