Electronic Supplementary Material (ESI) for RSC Advances.

Supplementary information

Magnetic Metrology for iron oxide nanoparticles scaled-up synthesis

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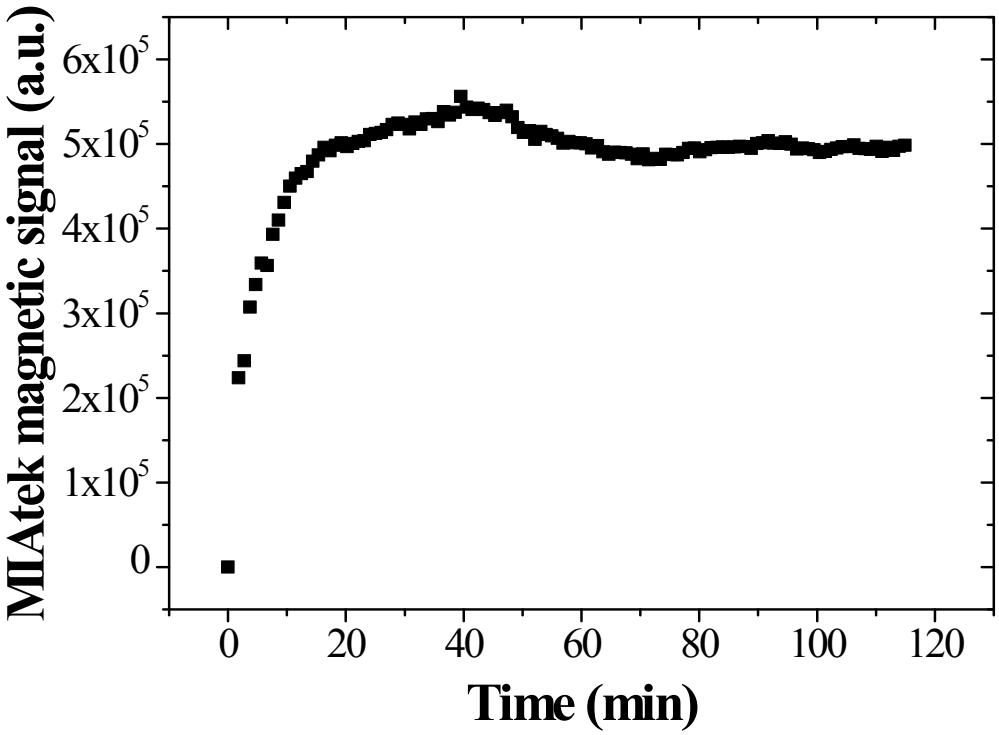
Figure S1: Typical time series of the nucleation and growth process followed with MIAtek reader for longer reaction time.

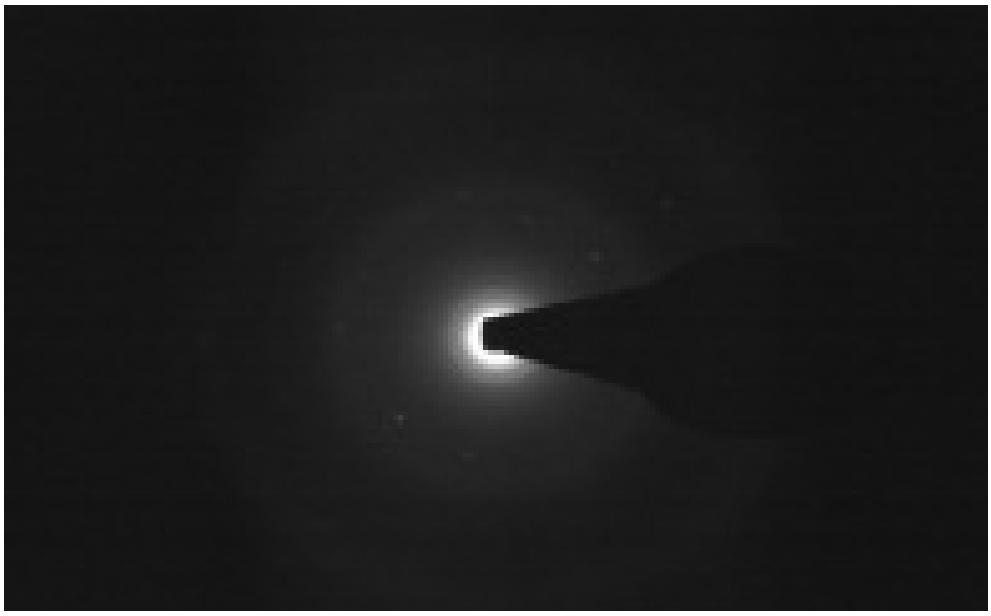


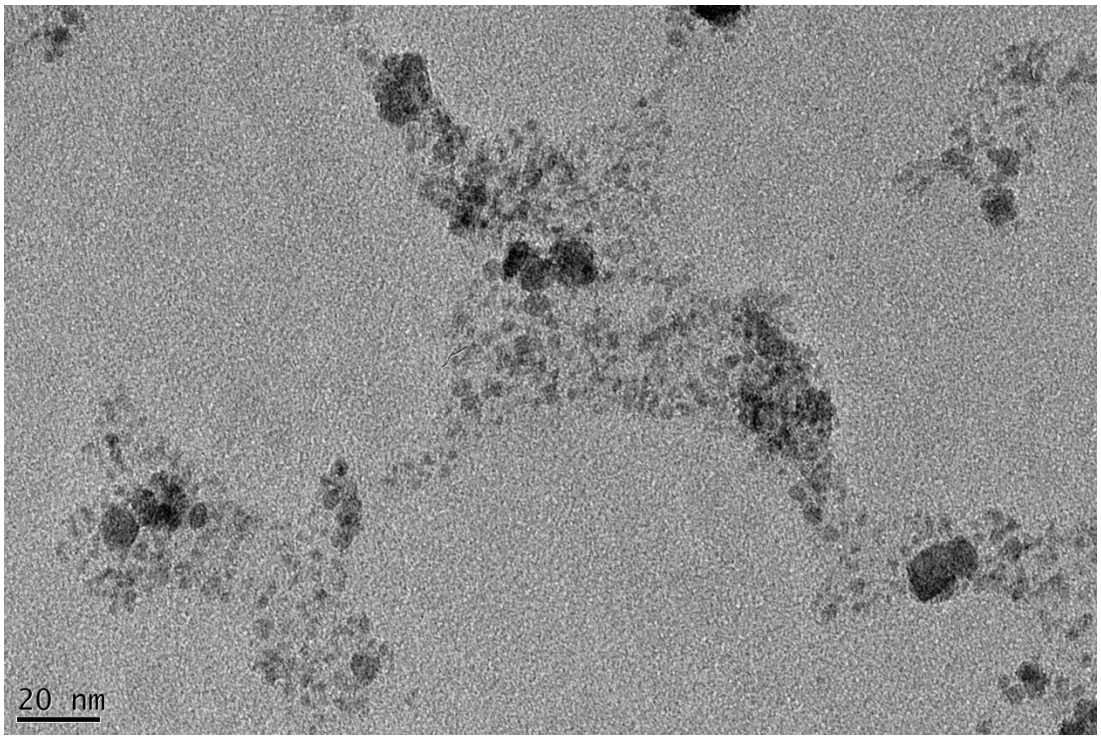
Calculation of boundary window for estimated ranges for surface and bulk-energy ratio for Fh/Mt stability. In our experimental conditions, we added 0.014 mol min^{-1} Fe to 750 ml total volume. Considering the nucleation of Mt from primary particles within 3 min, this is equivalent to an iron concentration c(Fe) < 6. 10^{-3} M. Taking solubility and surface energy of Mt and Fh, reported in *Baumgartener publication: Cs(Mt) = 5.*10^{-8} *M and C(Fh) =* 10^{-7}-10^{-6} M, γ_{Fh}= 0.2-0.4 J m^{-2} and γ_{Mt} = 0.79 J m^{-2} therefore g_{Fh}/g_{Mt} is in the range of 0,7-0,94 and γ_{Fh}/γ_{Mt} = 0.25-0.5. The respective ranges correspond to window stability defined in phase diagram calculated by *Baumgartener et al (*Fig 4 rectangle)[1]

1. Baumgartner, J. et al., Nucleation and growth of magnetite from solution. *Nat Mater*, **12**, 310-314 (2013).

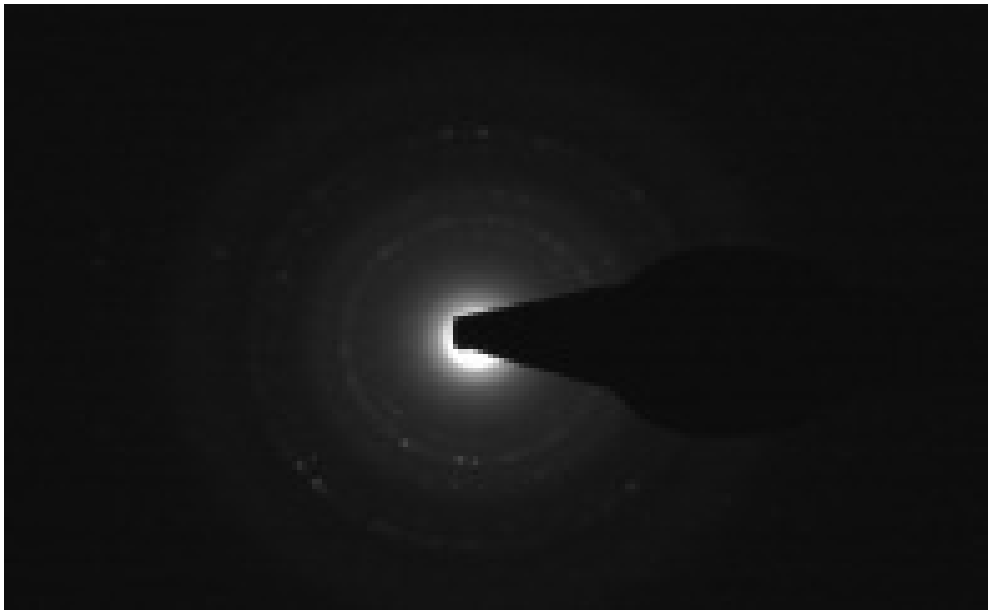
Figure S2: TEM images and electron diffraction patterns of the various aliquoted samples

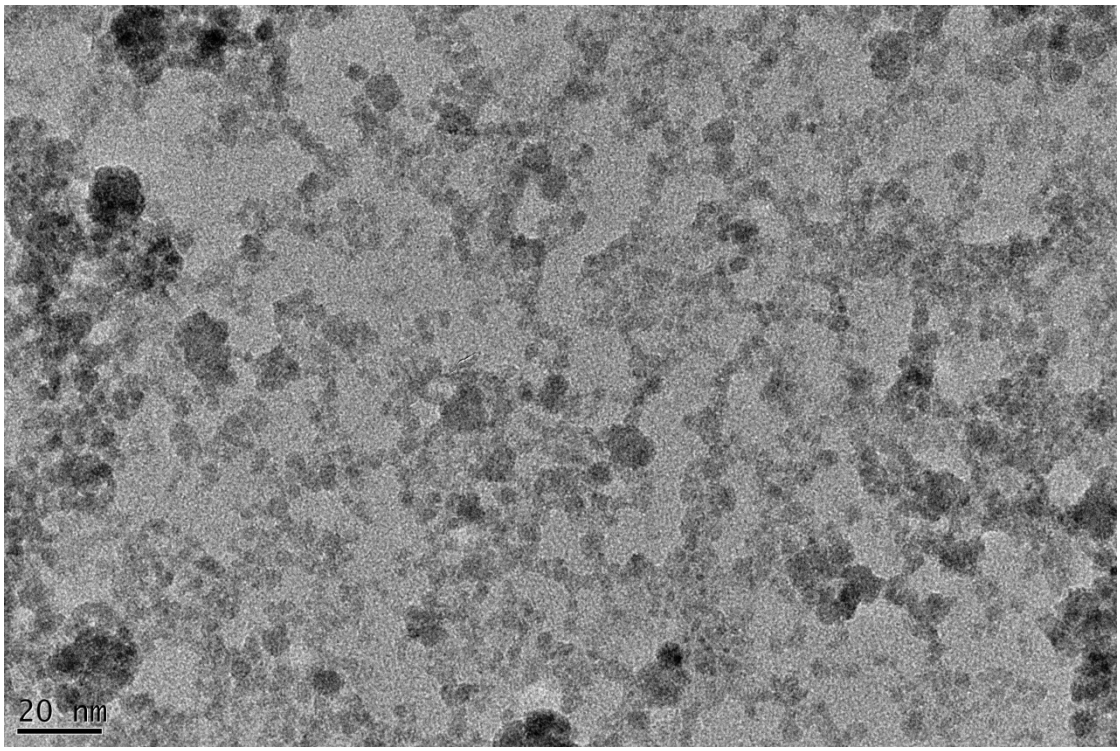
a) t2



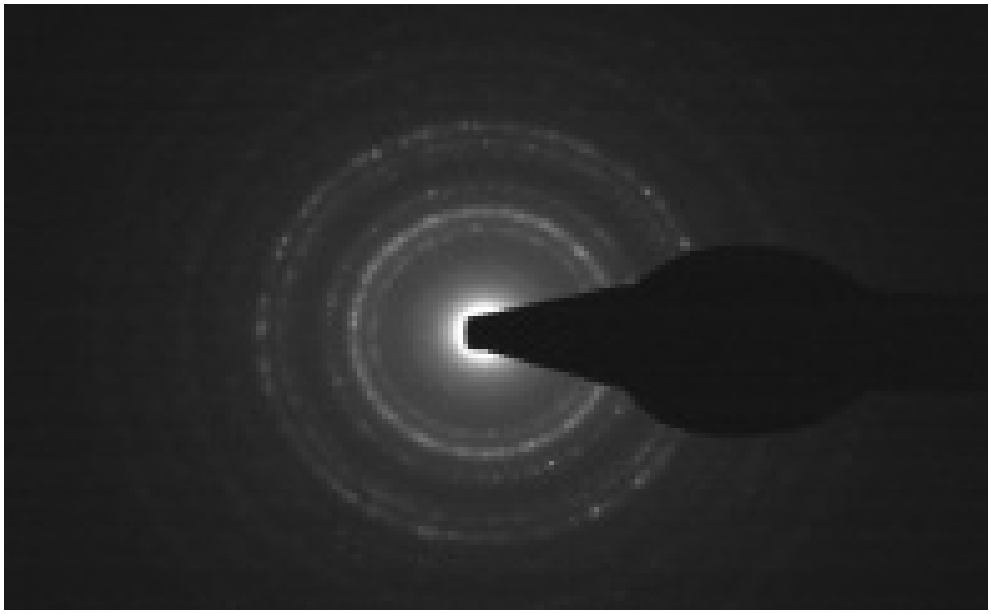


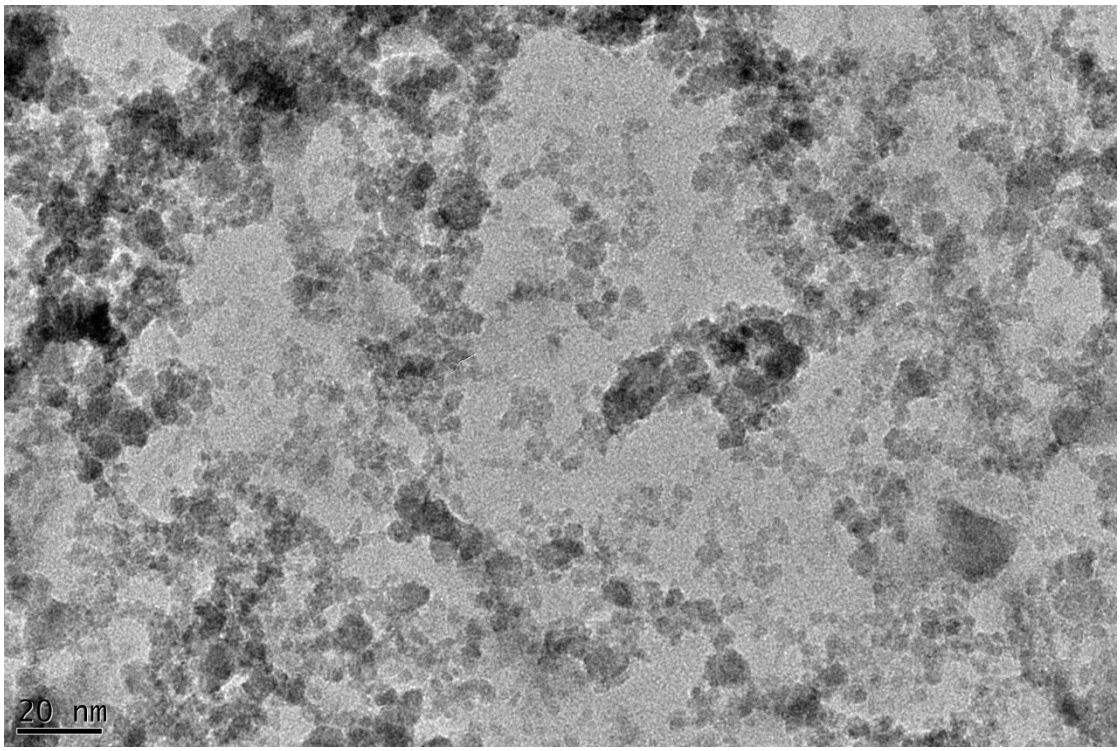
b) t5



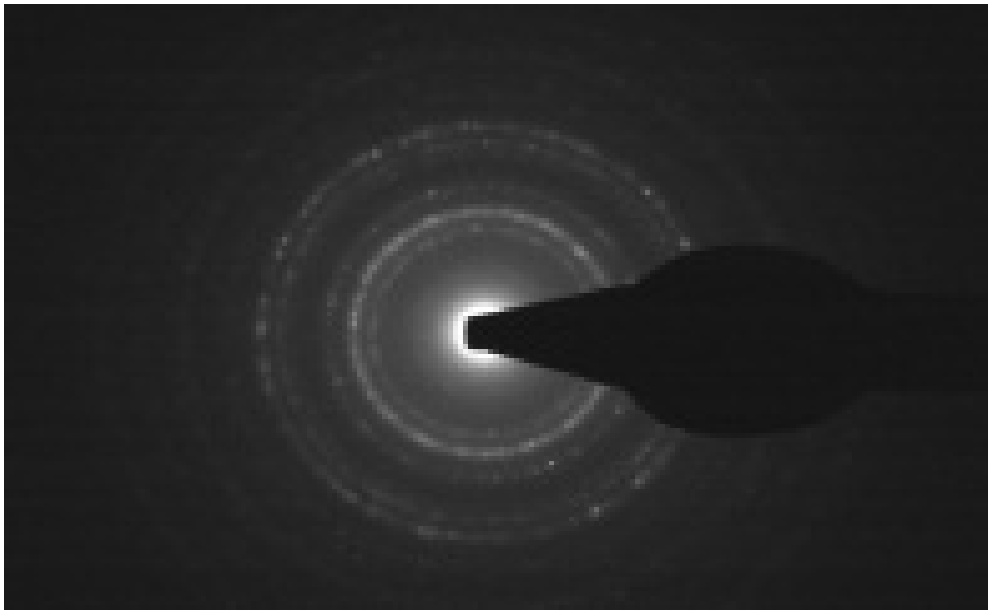


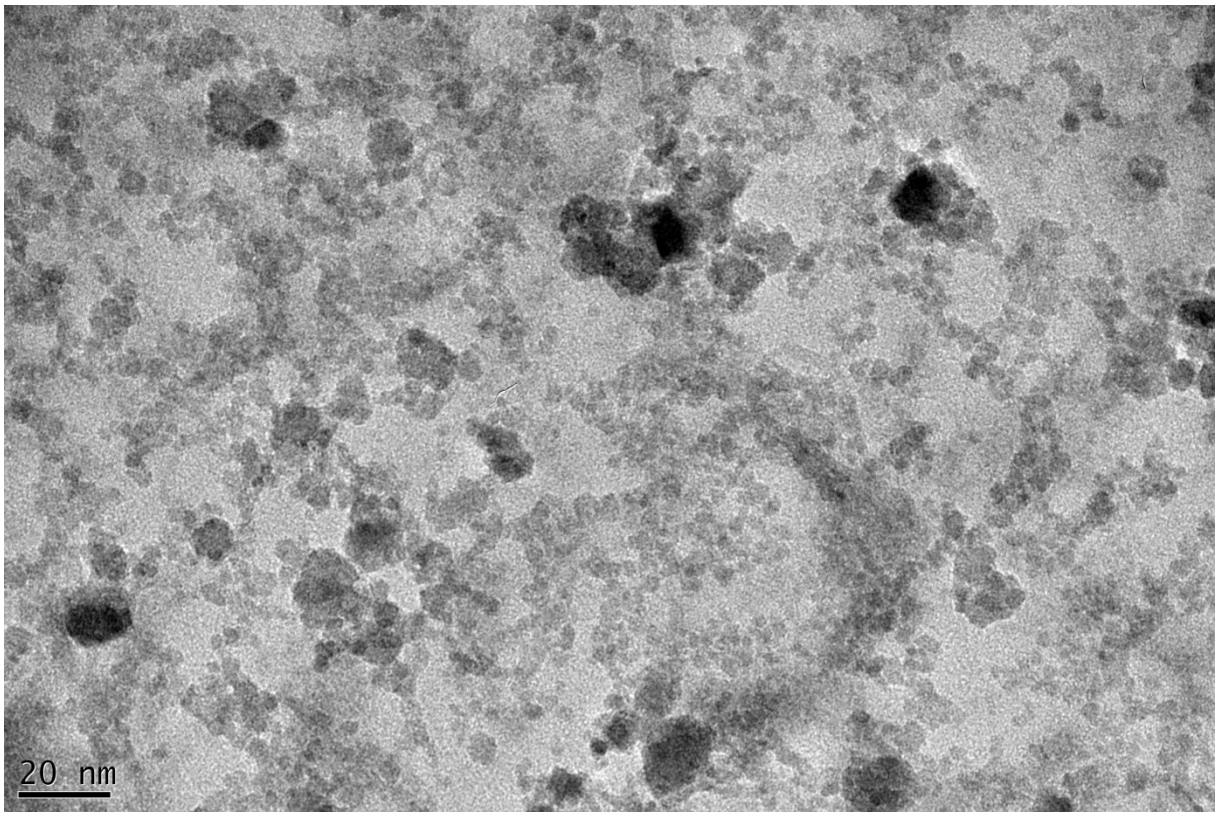
c) t10



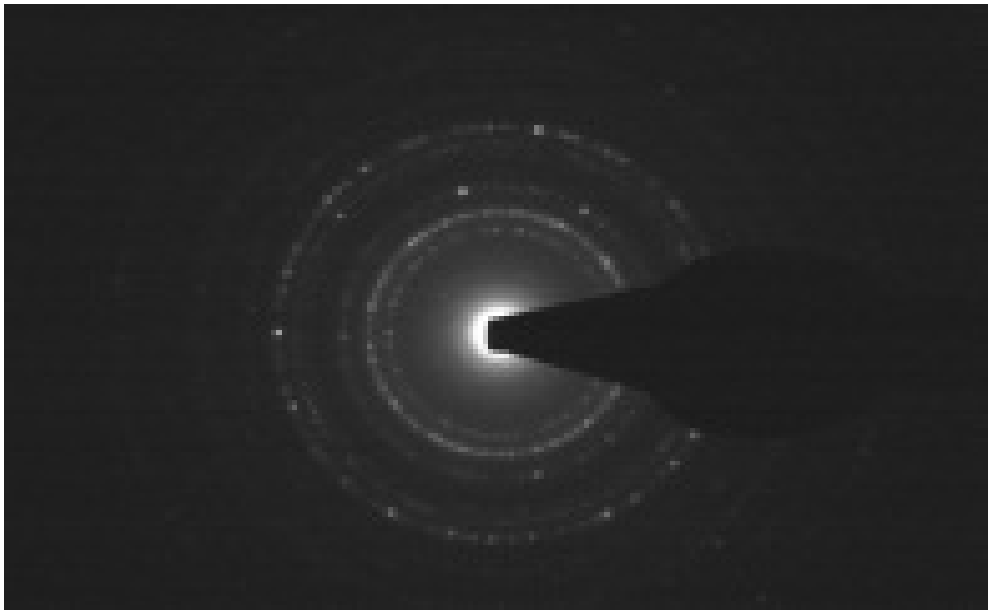


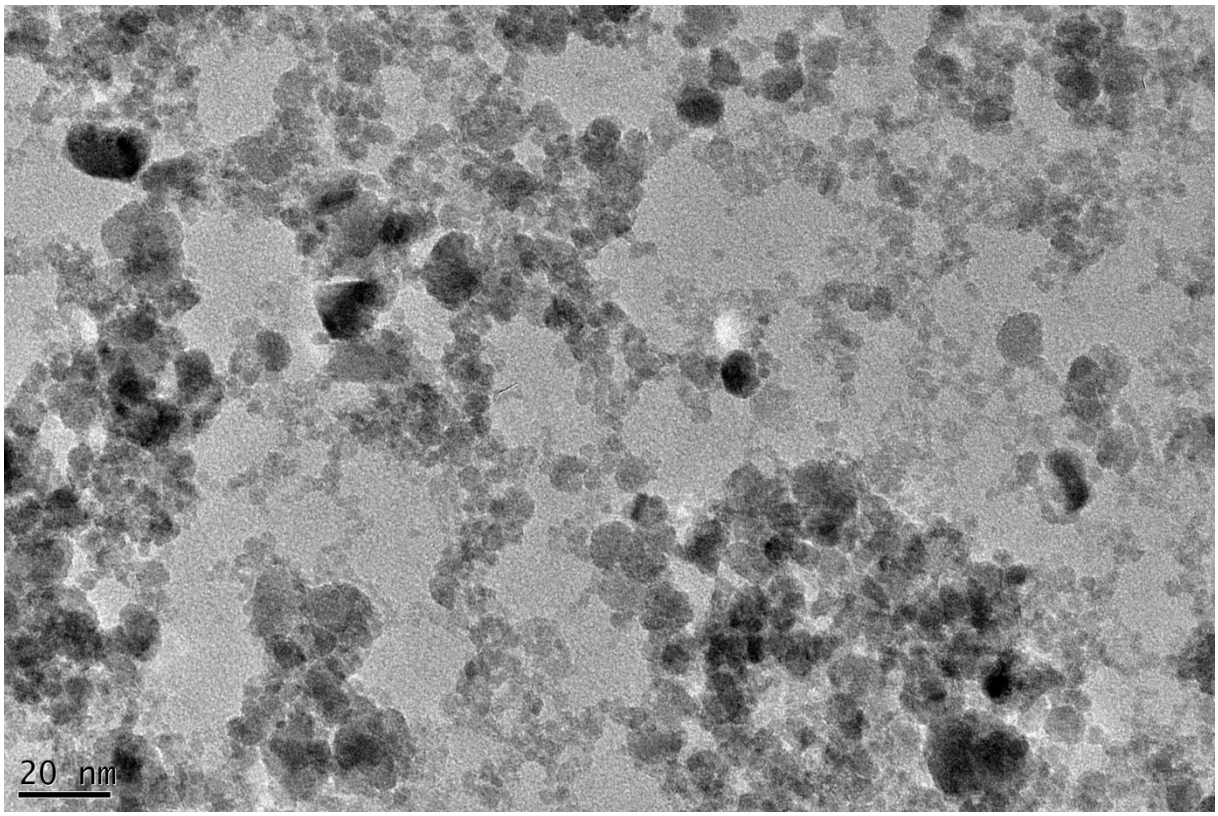
d) t20



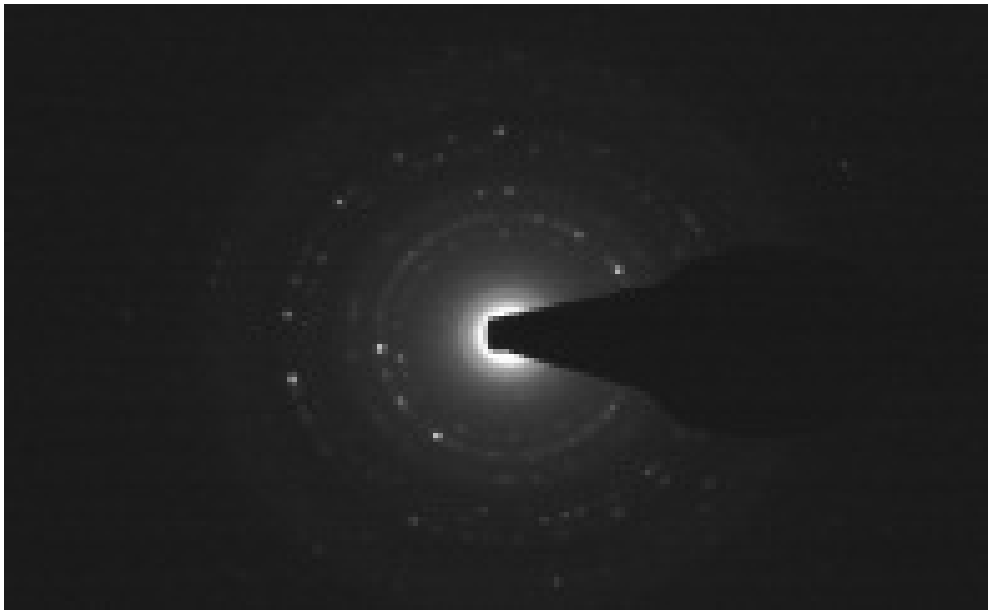


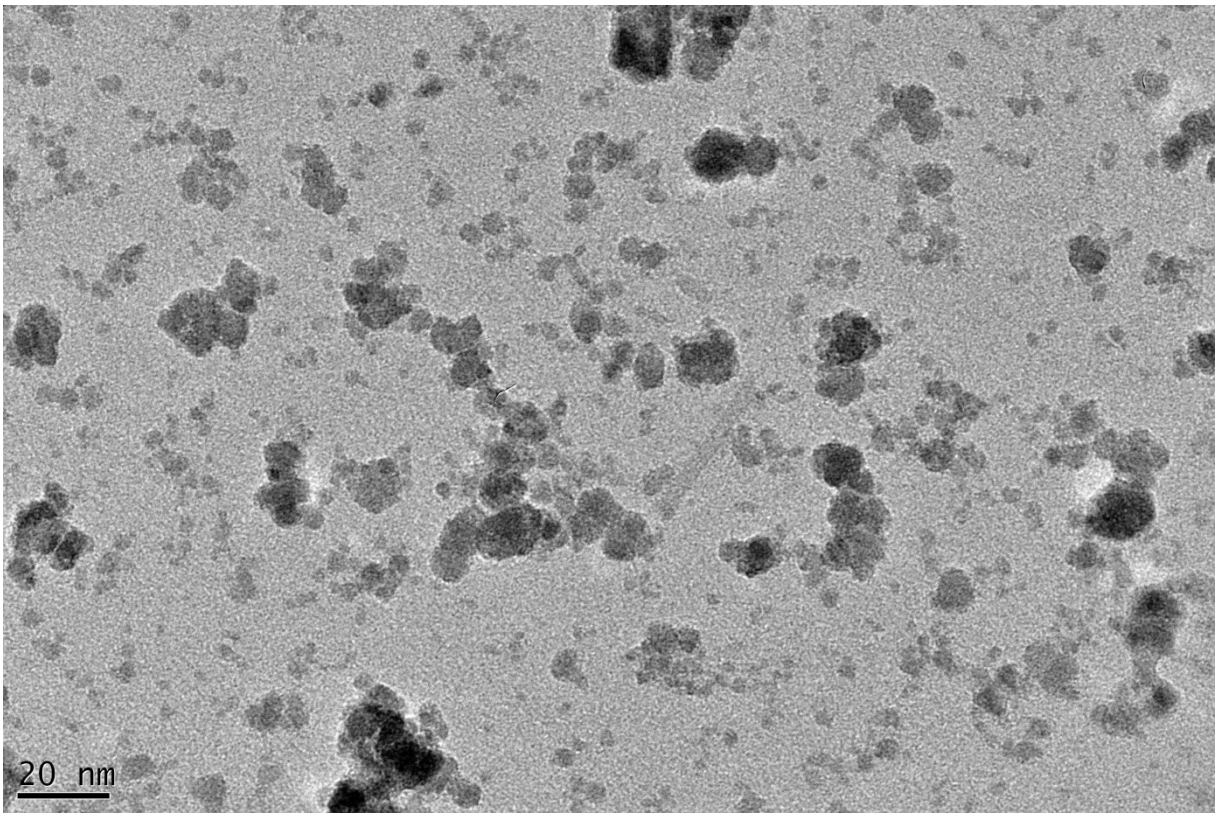
e) t30





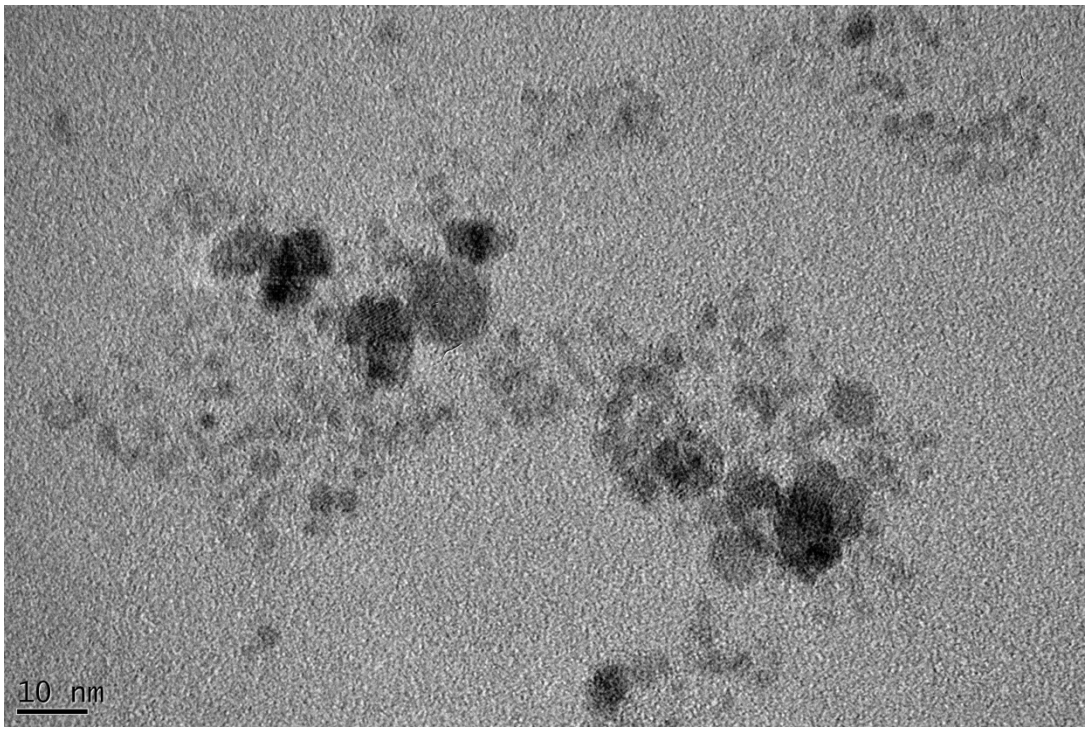
f) t40

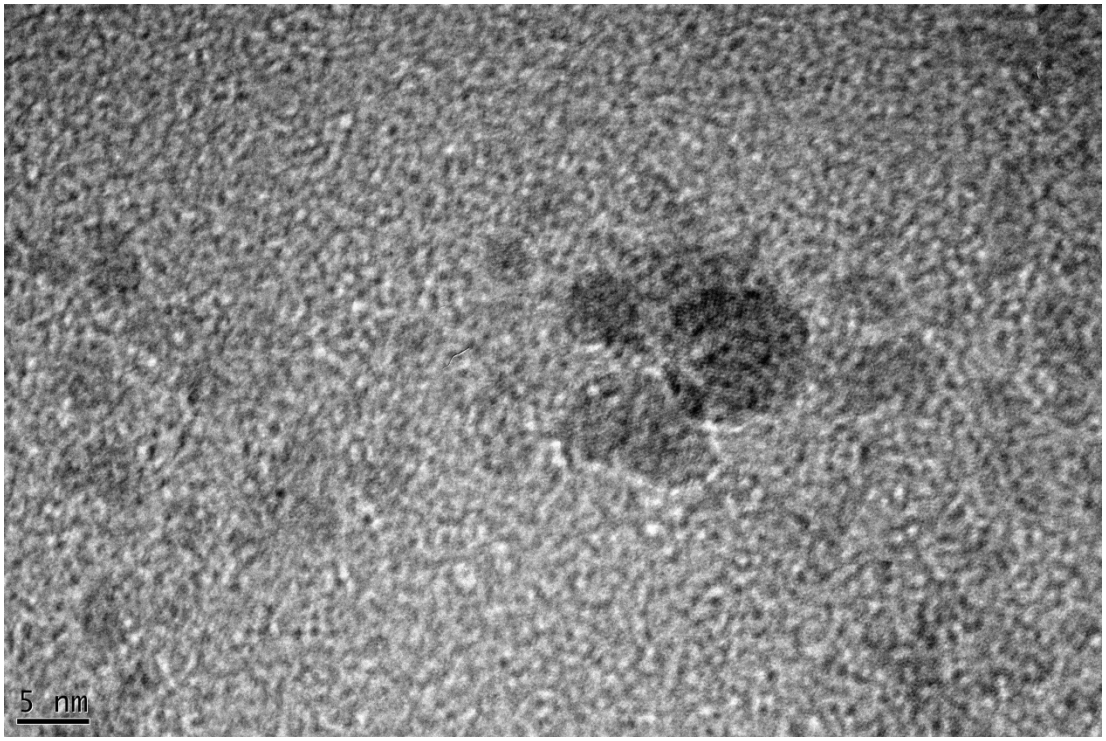


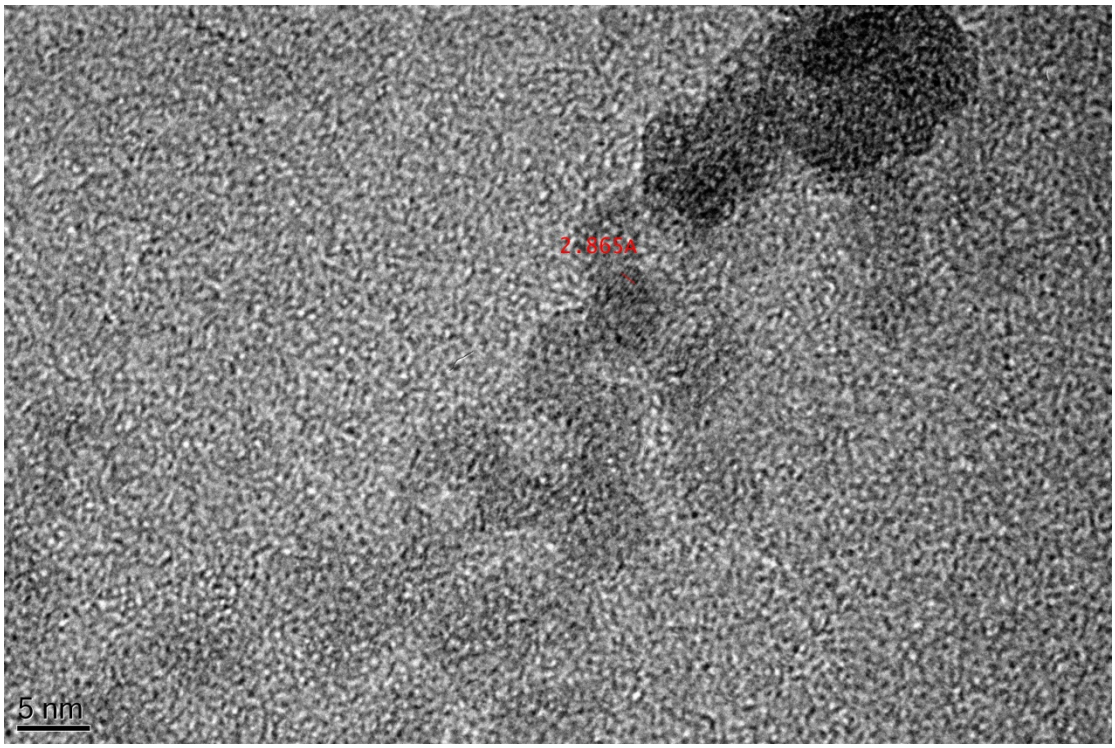


TEM images with various magnifications

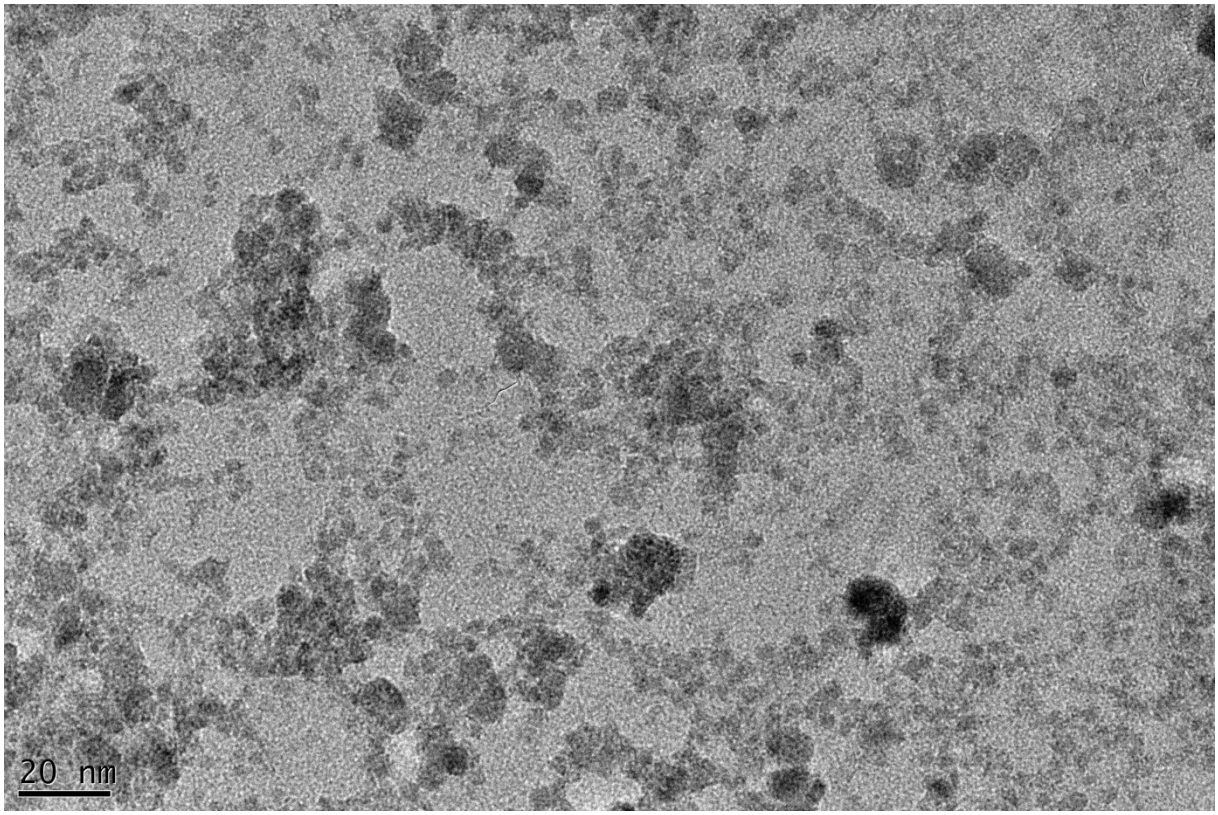
sample t2

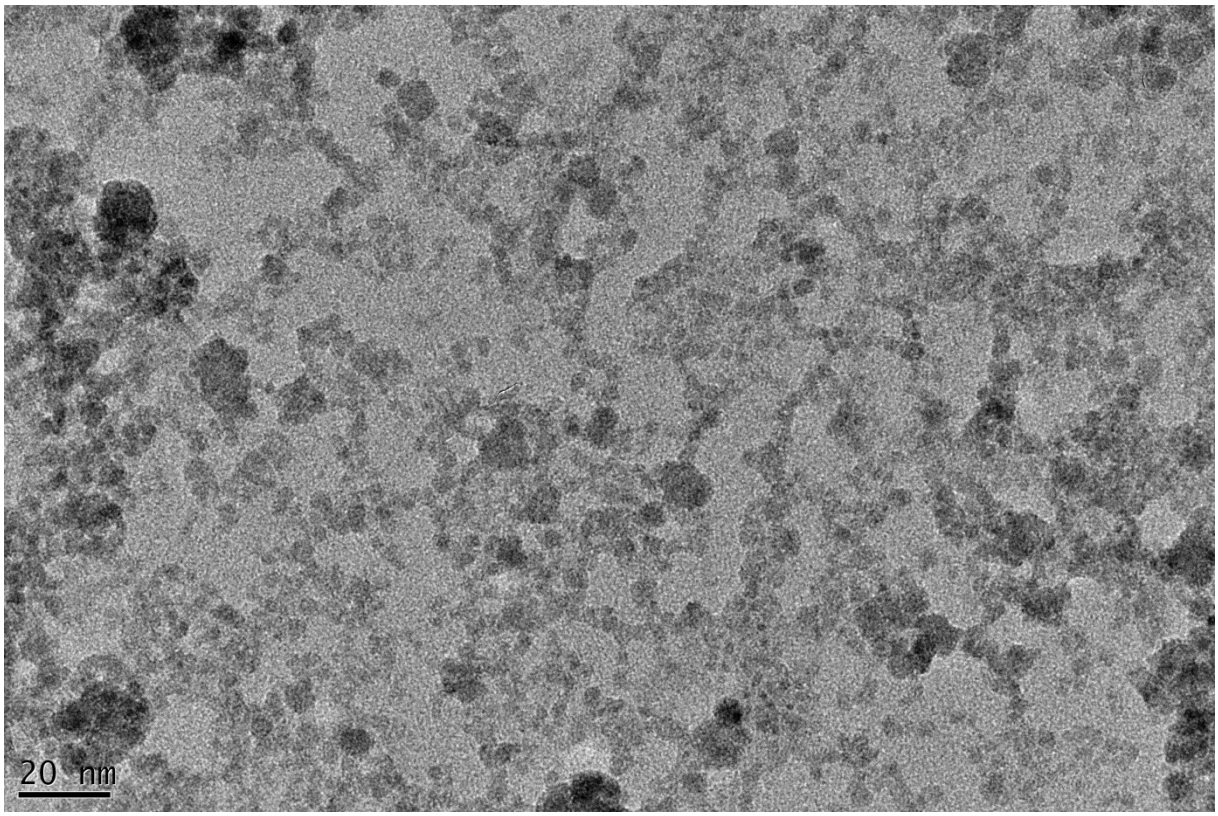




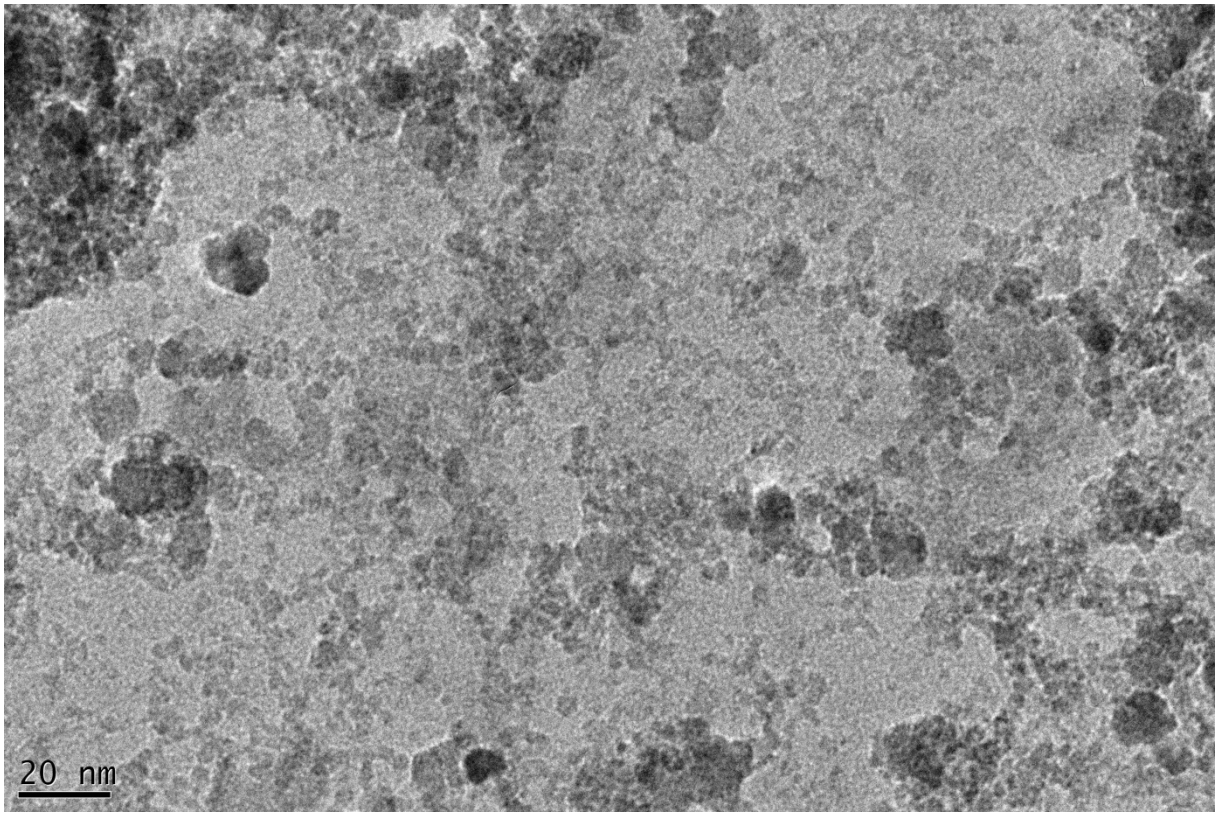


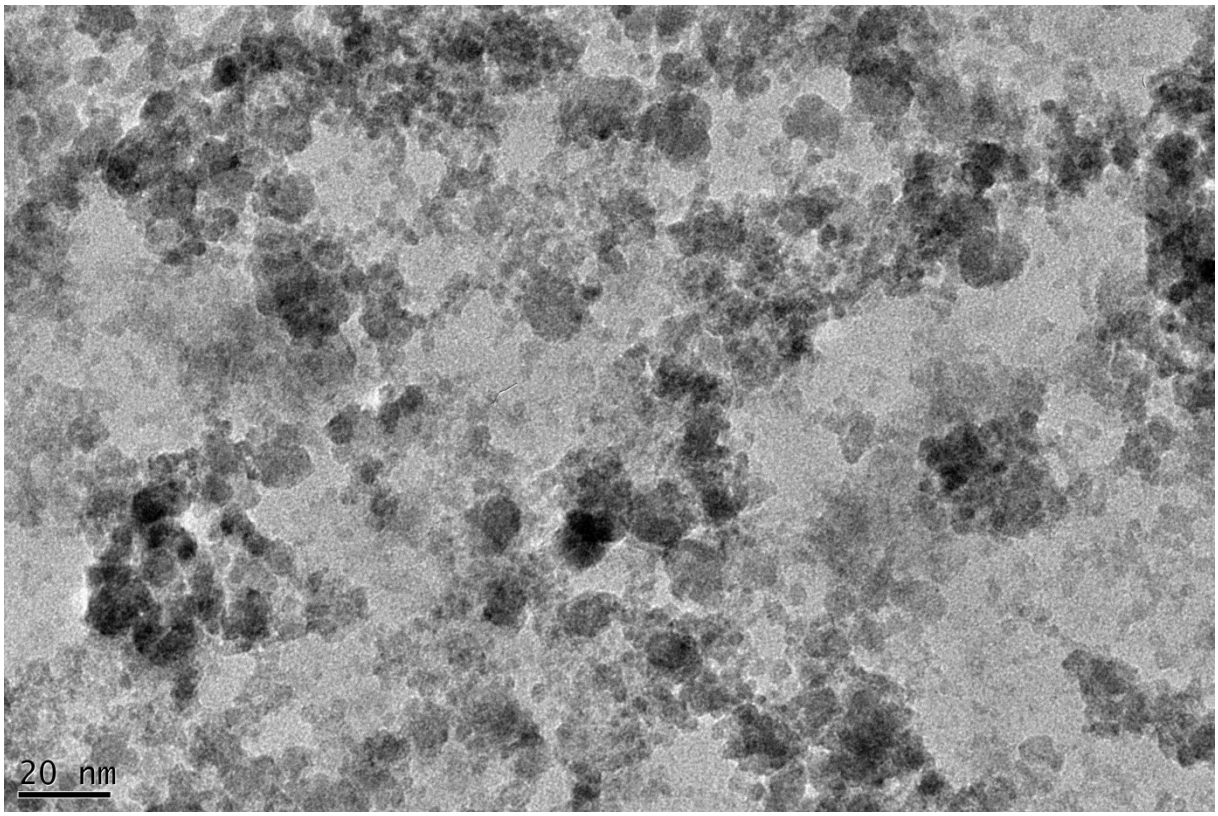
sample t5

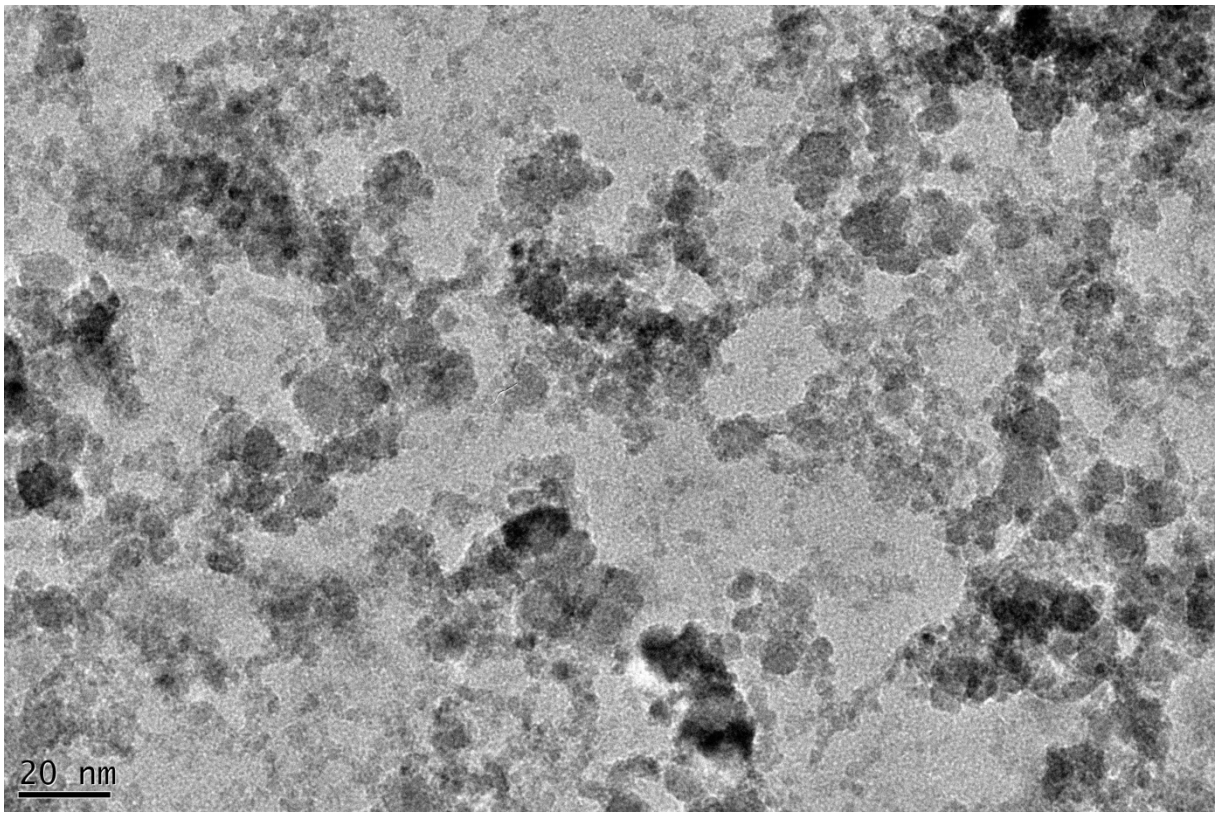




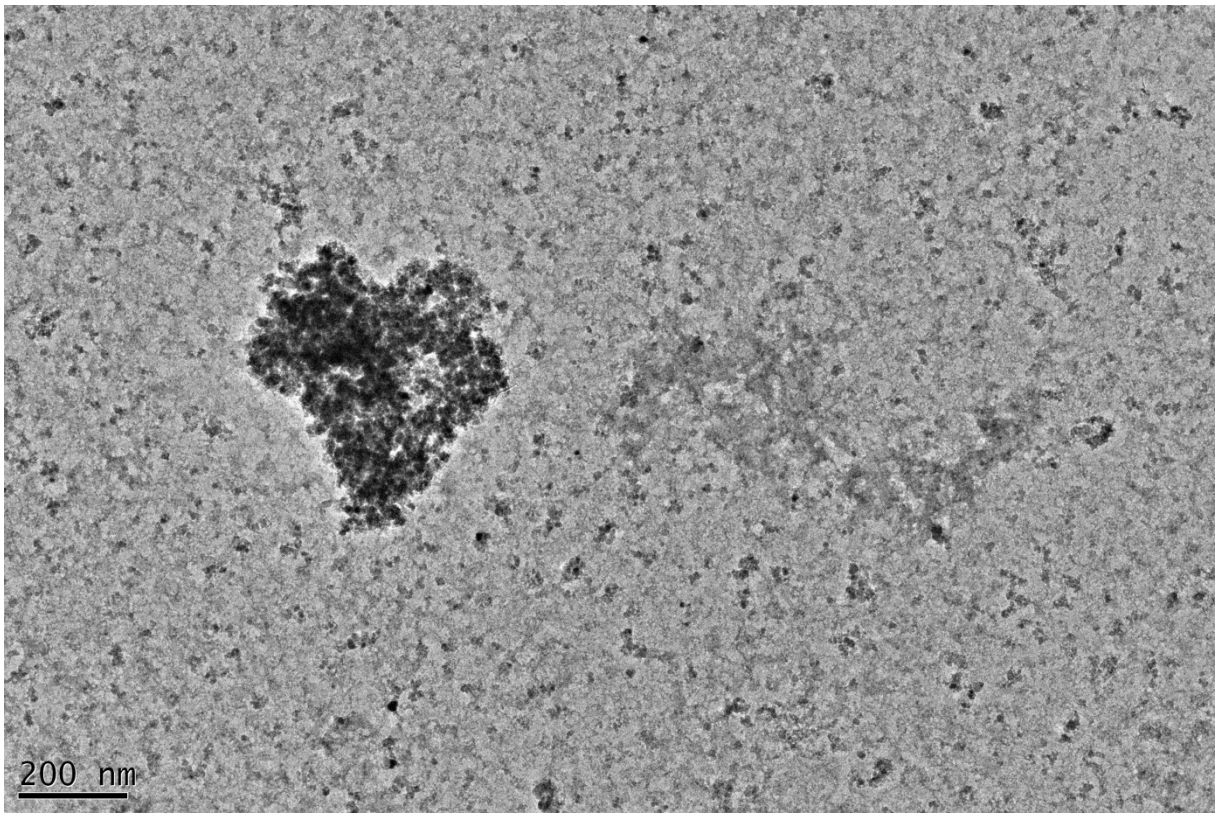
sample t10

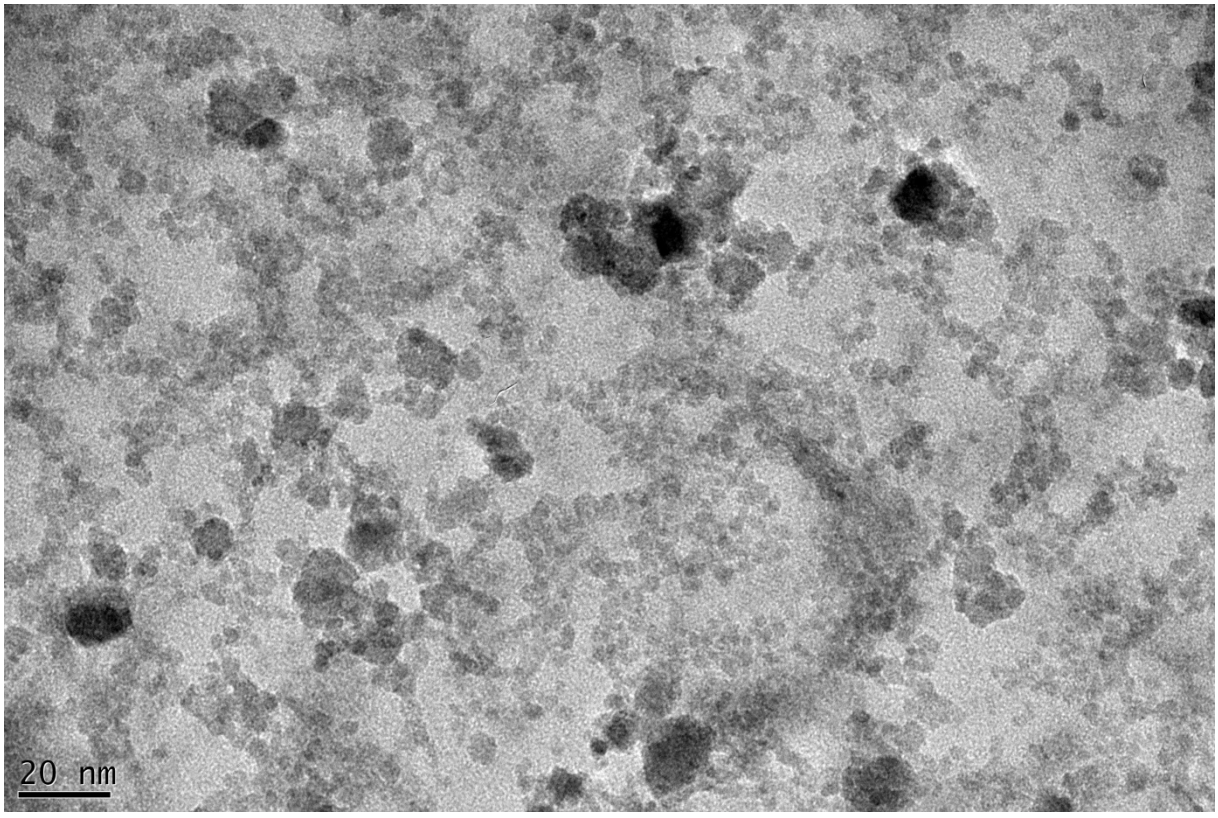



20 nm

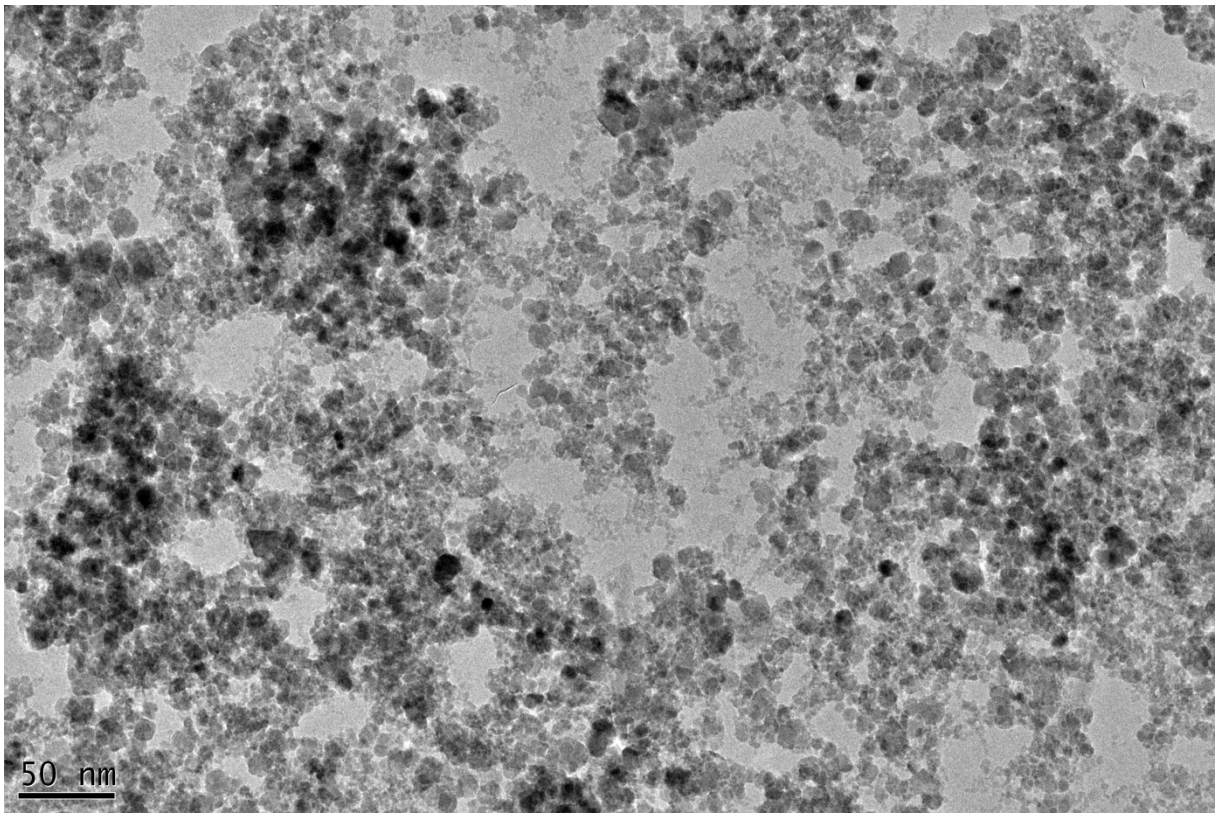

20 nm

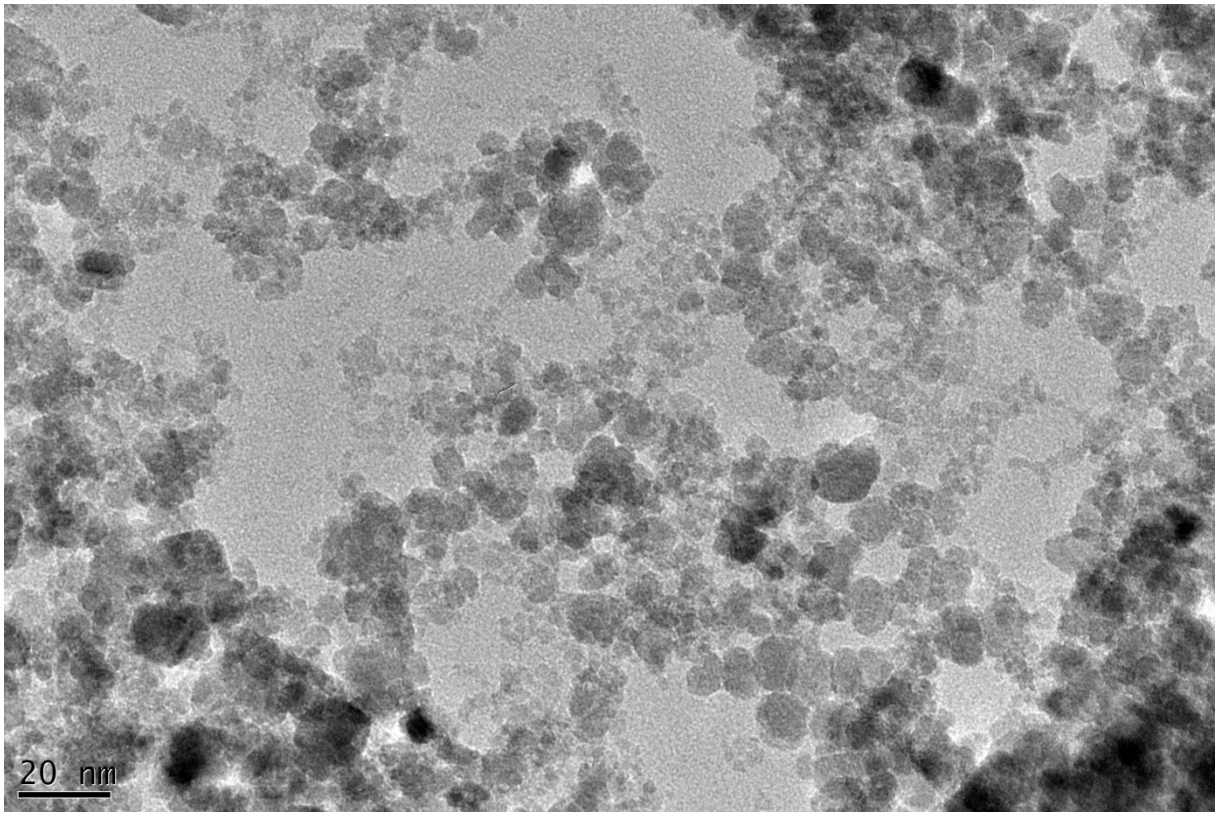
sample t20





sample t30





sample t40