Supplementary Materials

Multiscale multi-technique characterization of the pore network structure for nickel-iron-based industrial catalysts

Yanwei Huang[1,2,3], Fen Tao[1,2,3]Ling Zhang[2], Jun Wang[2], Guohao Du[2], Tiqiao Xiao[1,2,3], Biao Deng[1,2,3]

[1]Shanghai Institute of Applied Physics, China Academy of Sciences, Shanghai 201800, China.
[2]Shanghai Synchrotron Radiation Facility, Shanghai Advanced Research Institute, Chinese Academy of Sciences, Shanghai 201204, China.
[3]University of Chinese Academy of Science, Beijing 100084, China.

Correspondence to: Dr. Biao Deng, Shanghai Synchrotron Radiation Facility, Shanghai Advanced Research Institute, Chinese Academy of Sciences, 239 Zhangheng Road, Pudong New District, Shanghai 201204, China. E-mail: dengb@sari.ac.cn

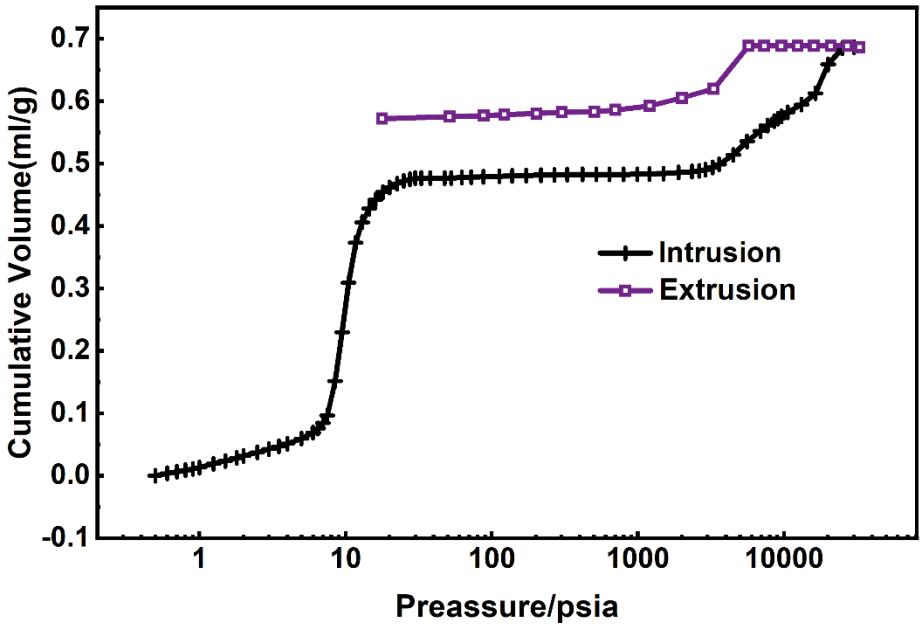

Figure S1. MIP intrusion and extrusion curve. The intrusion curve indicates that as the applied pressure increases, mercury initially penetrates the interparticle pores and subsequently infiltrates the intraparticle pores, resulting in an increase in cumulative volume. In contrast, the extrusion curve shows that mercury is not completely expelled from the sample, suggesting a complex pore structure within the catalyst. This observation implies the presence of ink-bottle pores or other complex pore geometries that trap mercury during the extrusion process.

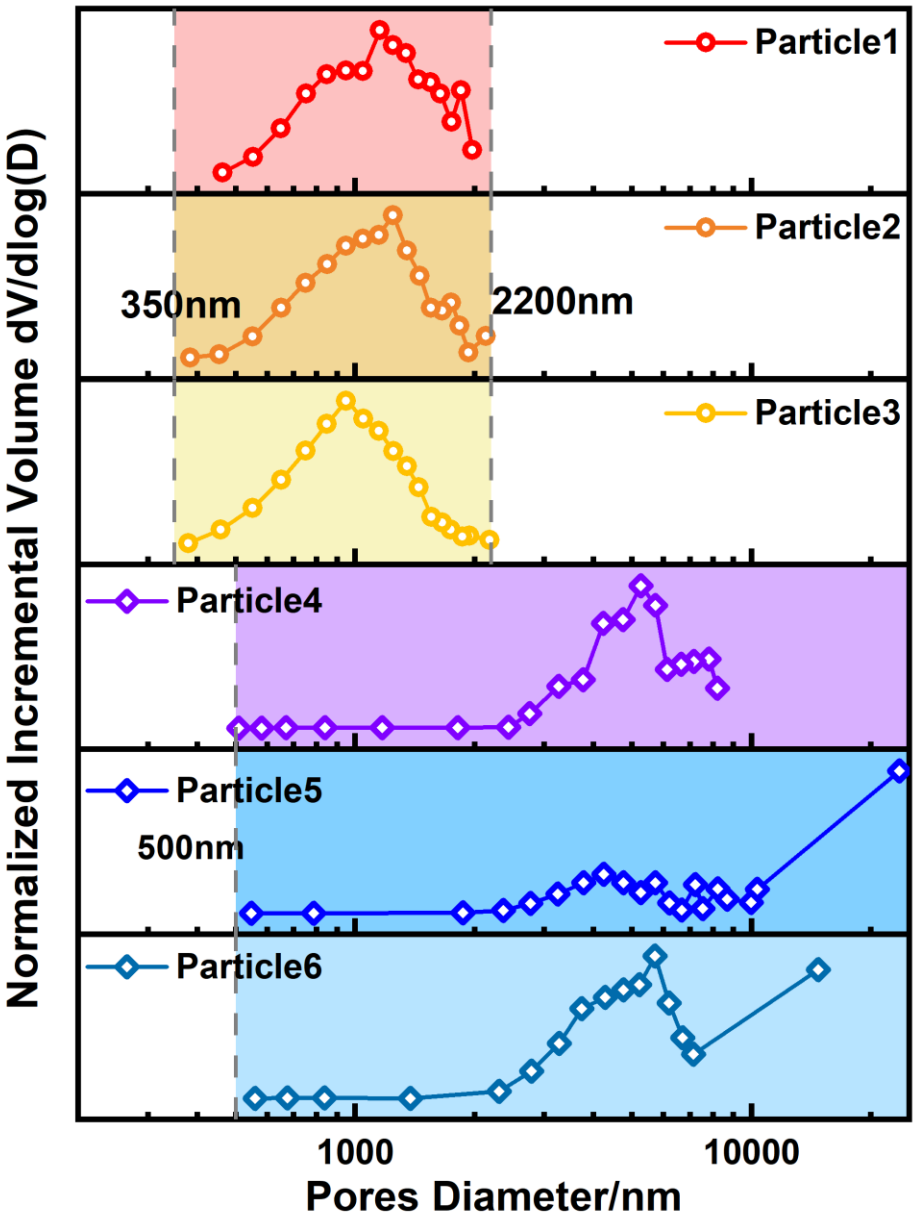

Figure S2. Normalized pore size distribution curves for six individual catalyst particles, as derived from multi-scale CT imaging. Particles 1 - 3 were captured using nano-CT (45 nm/pixel), while particles 4 - 6 were imaged with micro-CT (325 nm/pixel).

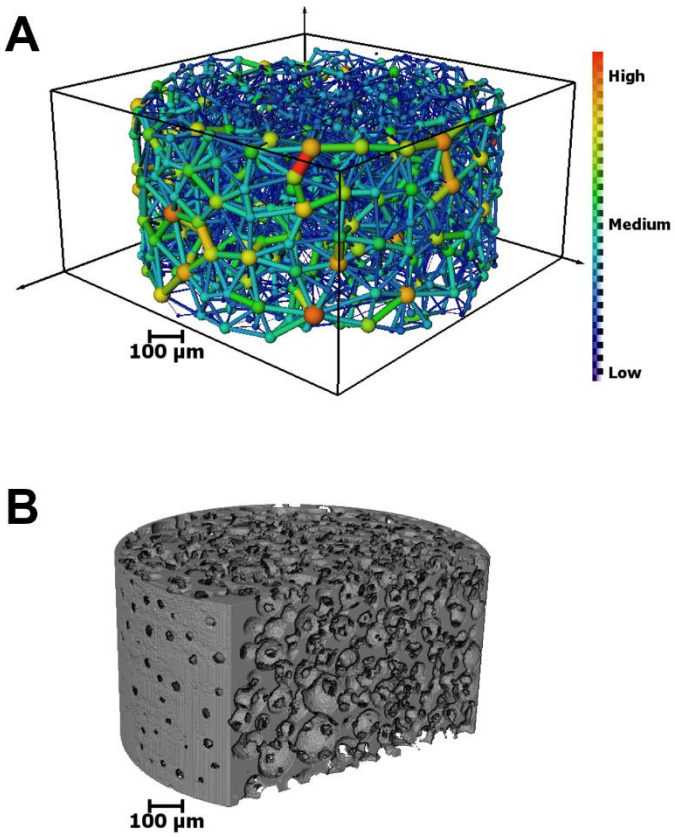

Figure S3. Inter-particle gap pore structure extracted by multi-particle catalyst micro-CT (650 nm/ pixel) (A) three-dimensional reconstruction of interstitial pore structure (B) PNM of interstitial pore structure.

Supplementary Table

Table S1. Dimensions and porosity of six single-particle catalysts obtain from multi-scale CT

Particle ID	Diameter/μm	Inside Diameter/μm	Total Porosity	Connect Porosity
1	15.63		24.96%	23.93%
2	19.65		23.34%	22.29%

3	23.42		23.66%	22.63%
4	52.60		19.81%	18.76%
5	48.76	14.30	23.44%	22.60%
6	56.70	23.00	21.83%	20.59%