

Water Based Scale-up of CPO-27 Synthesis for Nitric Oxide Delivery

Damiano Cattaneo¹, Stewart J Warrender¹, Morven J Duncan¹, Russell E Morris¹, Richard Castledine², Nigel Parkinson² and Ian Haley³

¹School of Chemistry, University of St Andrews, North Haugh, St Andrews KY16 9ST, UK

²Fine Industries Ltd, Seal Sands, Middlesbrough, TS2 1UB, UK

³Mettler-Toledo Ltd, 64 Boston Rd, Beaumont Leys, Leicester, LE4 1AW, UK

Supporting Information

The research data supporting this publication can be accessed at:

<http://dx.doi.org/10.17630/85aa840e-aaf0-4c57-90b7-cb30df6076e7>

Table 1: Total NO release, duration of dose and BET surface area measurements for all samples.

Sample	Total NO release (mmol/g)	Duration of release (hr)	BET surface area (m ² /g)
CPO-27 (Ni)			
Solv	6.31	36.6	1094
2SRF	5.24	36	349
2SRT	0.001	3	33
1SRF	4.18	42.7	350
1SRT 30ml	2.8	11.9	62
1SRT 500ml	3.43	28.8	208
1SRT 20L	2.92	27.3	292
CPO-27 (Zn)			
Solv	0.16	15.4	252
2SRF	0.15	11	181
2SRT	0.05	9.92	117
1SRF	0.08	8.47	104
1SRT 30ml	0.05	9.11	-
1SRT 500ml	0.05	7.73	280
1SRT 20L	0.04	9.13	250
1SRT 100L	0.09	30	-
CPO-27 (Mg)			
Solv	0.03	7	101
2SRF	0.04	7	1032

Figure 1: Adsorption \blacksquare and desorption \square isotherms of NO at 298K (measured using gravimetric analysis) plotted as millimoles per gram against change of pressure for (a) Solv-CPO-27 (Mg) as prepared, (b) Solv-CPO-27 (Zn) as prepared, (c) Solv-CPO-27 (Mg) after solvent exchange and (d) Solv-CPO-27 (Zn) after solvent exchange.

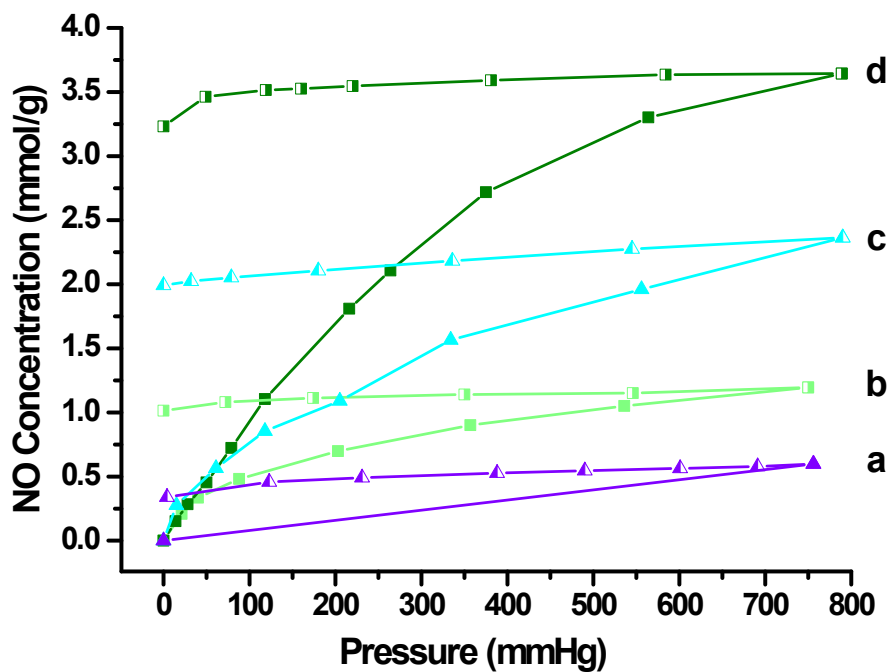


Figure 2: Thermogravimetric profiles of (a) Solv-CPO-27 (Ni), (b) 2SRF-CPO-27 (Ni), (c) 2SRT-CPO-27 (Ni), (d) 1SRF-CPO-27 (Ni), (e) 1SRT-CPO-27 (Ni), (f) Solv-CPO-27 (Zn), (g) 2SRF-CPO-27 (Zn), (h) 2SRT-CPO-27 (Zn), (i) 1SRF-CPO-27 (Zn), (j) 1SRT-CPO-27 (Zn), (k) Solv-CPO-27 (Mg) and (l) 2SRF-CPO-27 (Mg).

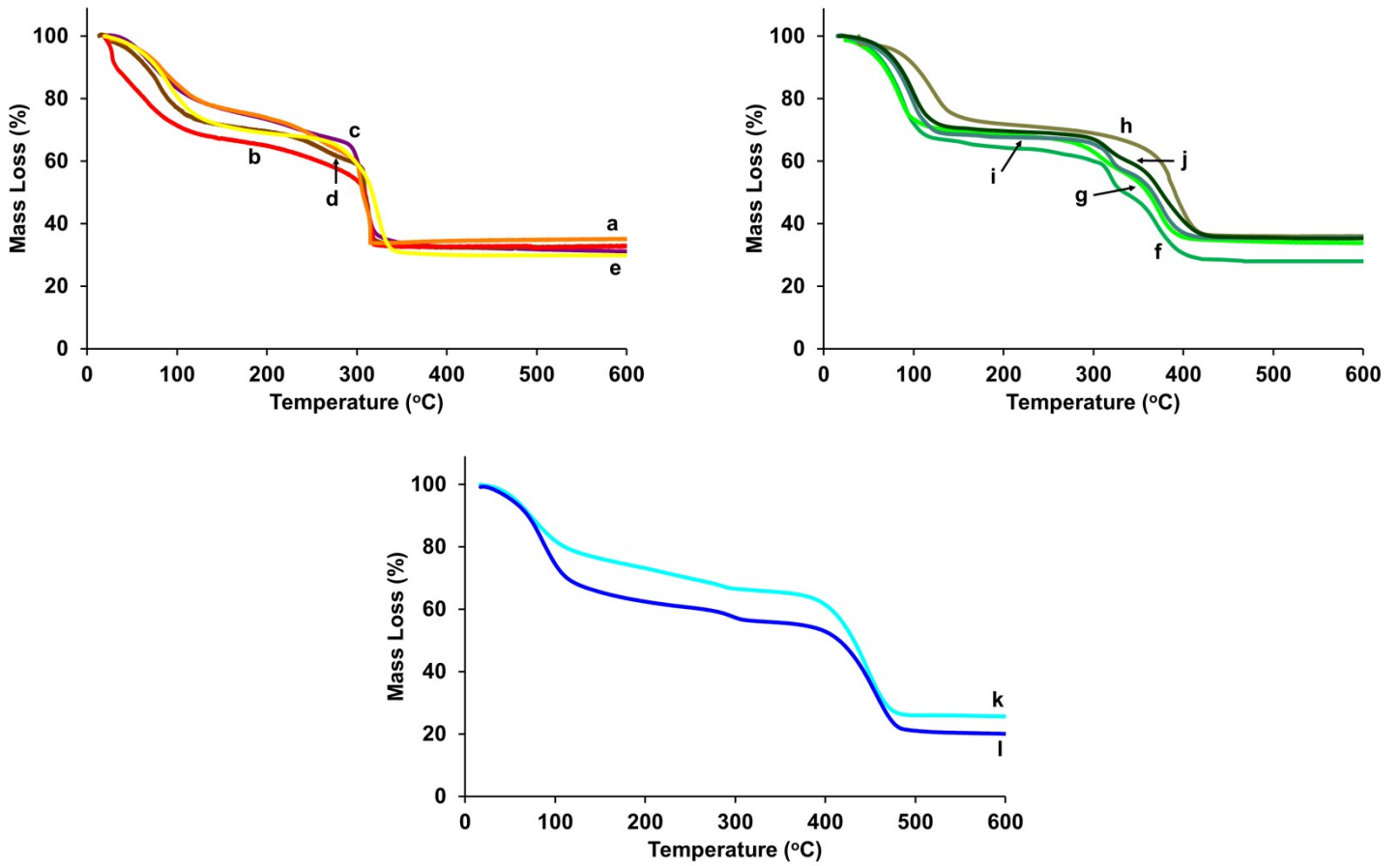


Figure 3: Adsorption \blacksquare and desorption \square isotherms of NO at 298K (measured using gravimetric analysis) plotted as millimoles per gram against change of pressure for (a) Solv-CPO-27 (Mg), (b) 2SRF-CPO-27 (Mg), (c) Solv-CPO-27 (Zn), (d) 2SRF-CPO-27 (Zn), (e) Solv-CPO-27 (Ni) and (f) 2SRF-CPO-27 (Ni).

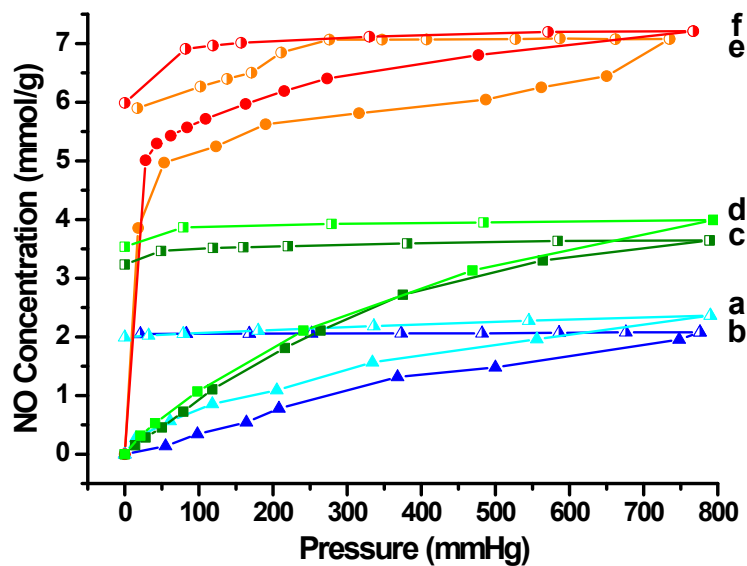


Figure 4: Total NO release (measured using chemiluminescence analysis) on contact with humid atmosphere (11% RH) for (a) Solv-CPO-27 (Ni), (b) 2SRF-CPO-27 (Ni), (c) 2SRT-CPO-27 (Ni), (d) Solv-CPO-27 (Zn), (e) 2SRF-CPO-27 (Zn), (f) 2SRT-CPO-27 (Zn), (g) Solv-CPO-27 (Mg) and (h) 2SRF-CPO-27 (Mg). Data collection was stopped when NO levels reached 20ppb.

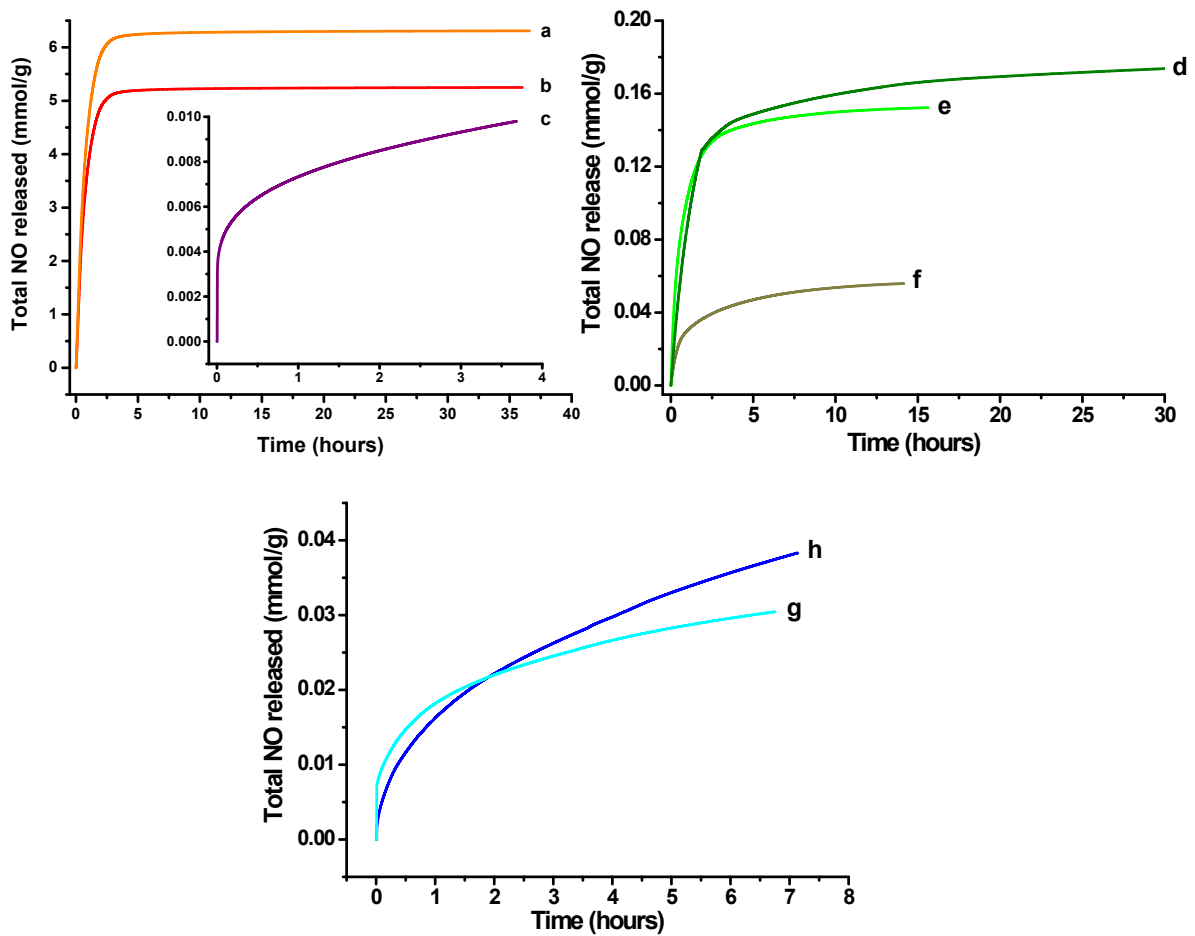


Figure 5: Total NO release on contact with humid atmosphere (11% RH) for (a) 1SRT-CPO-27 (Ni) 100ml, (b) 1SRT-CPO-27 (Ni) 1L, (c) 1SRT-CPO-27 (Ni) 20L, (d) 1SRF-CPO-27 (Ni) 100ml, (e) 1SRT-CPO-27 (Zn) 100ml, (f) 1SRT-CPO-27 (Zn) 1L, (g) 1SRT-CPO-27 (Zn) 20L, (h) 1SRT-CPO-27 (Zn) 100L and (i) 1SRF-CPO-27 (Zn) 100ml. Data collection was stopped when NO levels reached 20ppb.

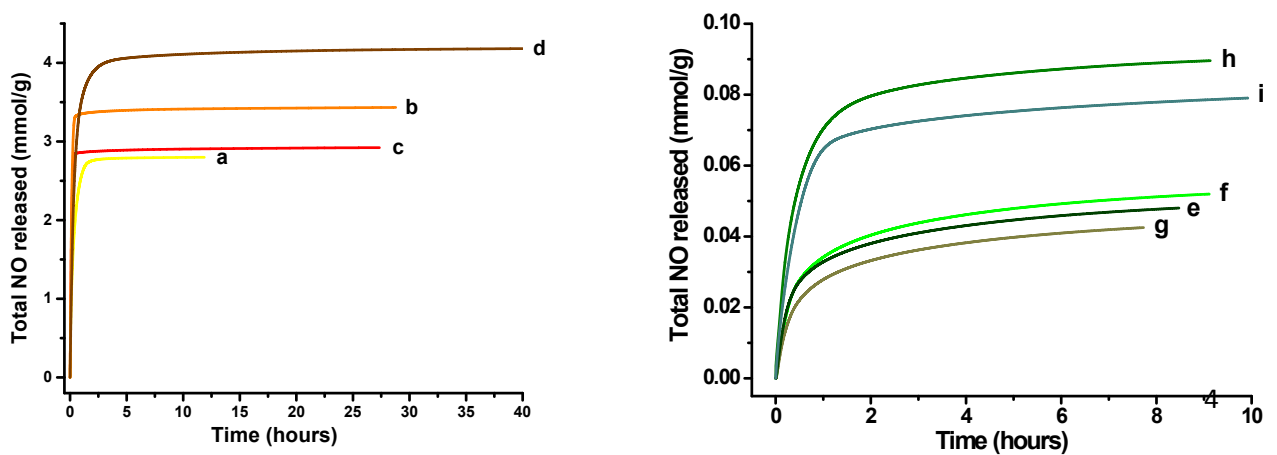


Figure 6: Comparison of synthesis method, BET surface area and NO release parameters.

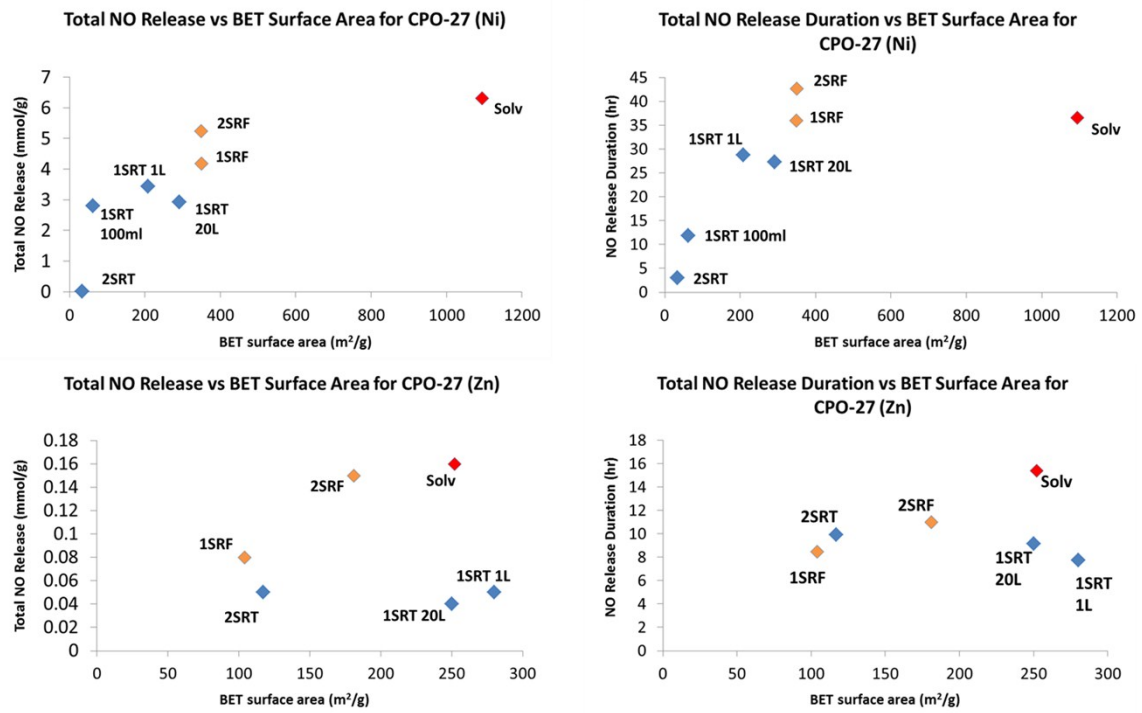


Figure 7: SEM images of CPO-27 (Zn) prepared under different conditions and at different scales ranked in order from highest NO delivery (a) to lowest (g). (a) **Solv**-CPO-27 (Zn), (b) **2SRF**-CPO-27 (Zn), (c) **1SRT**-CPO-27 (Zn) 100L, (d) **1SRF**-CPO-27 (Zn), (e) **1SRT**-CPO-27 (Zn) 100ml, (f) **2SRT**-CPO-27 (Zn), (g) **1SRT**-CPO-27 (Zn) 20L.

