

Supplementary Information

Molecularly Rigid Porous Polyamine Host Enhances Barium Titanate Catalysed H₂O₂ Generation

Akalya Karunakaran ^{1,2}, Chris R. Bowen ², Steve Dunn ³, Thuy-Phuong T. Pham ^{4,5}, Andrea Folli ⁶, Philip J. Fletcher ⁷, Mariolino Carta ⁸, Neil B. McKeown ⁹, and Frank Marken*¹

¹ *Department of Chemistry, University of Bath, BA2 7AY, Bath, UK*

² *Department of Mechanical Engineering, University of Bath, BA2 7AY, Bath, UK*

³ *London South Bank University, 103 Borough Road, London, SE1 0AA, UK*

⁴ *Institute of Chemical Technology, Vietnam Academy of Science and Technology, 1A TL29 Street, Thanh Loc Ward, District 12, HCM City, Vietnam*

⁵ *Graduate University of Science and Technology, Vietnam Academy of Science and Technology, 18 Hoang Quoc Viet Street, Cau Giay District, Hanoi, Vietnam*

⁶ *School of Chemistry, Cardiff University, Cardiff, CF10 3AT, UK*

⁷ *University of Bath, Imaging Facility, BA2 7AY, Bath, UK*

⁸ *Department of Chemistry, Swansea University, College of Science, Grove Building, Singleton Park, Swansea SA2 8PP, UK*

⁹ *EaStCHEM, School of Chemistry, University of Edinburgh, Joseph Black Building, David Brewster Road, Edinburgh, Scotland EH9 3JF, UK*

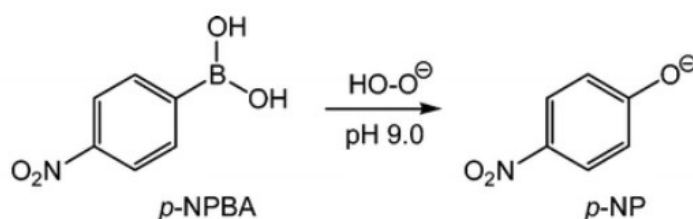
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(A) Detection of H₂O₂

The detection of hydrogen peroxide (H₂O₂) was performed by reaction with *para*-nitrophenol and LC/MS detection.¹ The catalyst (barium titanate or immobilised barium titanate in PIM-EA-TB) was submerged in 90% deionized water and 10% isopropanol and recovered after 5 minutes reaction time. A solution of 10 mM *para*-nitrophenyl boronic acid (p-NPBA, 1.3 mg) was added to 1 mL DMSO to prepare a diluted 0.1 mM p-NPBA solution in the mixture of 10% DMSO and 90% 10 mM carbonate buffer (pH 9). A volume of 100 μL sample solution containing H₂O₂ was added into 1 mL diluted p-NPBA, left it in the absence of light for an hour to complete the reaction (see equation S1). The p-NPBA reagent is sensitive to light, therefore the process has been carried in the dark. After an hour, the sample solution was diluted to 1/50 with 10% DMSO and 90% of deionized water. Each sample was analysed by mass spectrometry, along with blank samples. The amount of hydrogen peroxide present in each sample was quantified using LS-MS method, and Mass-Hunter quantitative analysis. Detection was achieved with mass spectrometry with an Automated Agilent QTOF (Walkup) used with HPLC (four chromatography columns) and a variable wavelength detector (VWD).



(S1)

(B) Reusing barium titanate embedded into PIM-EA-TB

By embedding barium titanate into the porous polymer host, the catalyst becomes easily recoverable and reusable. The reuse of catalyst is demonstrated in Figure S1A over several cycles. at maximum of approximately 0.25 mM of hydrogen peroxide in 1 mL of solution after 6 cycles, this time the samples were dispersed in same solution. Figure S1B shows the build-up of hydrogen peroxide concentration with each cycle.

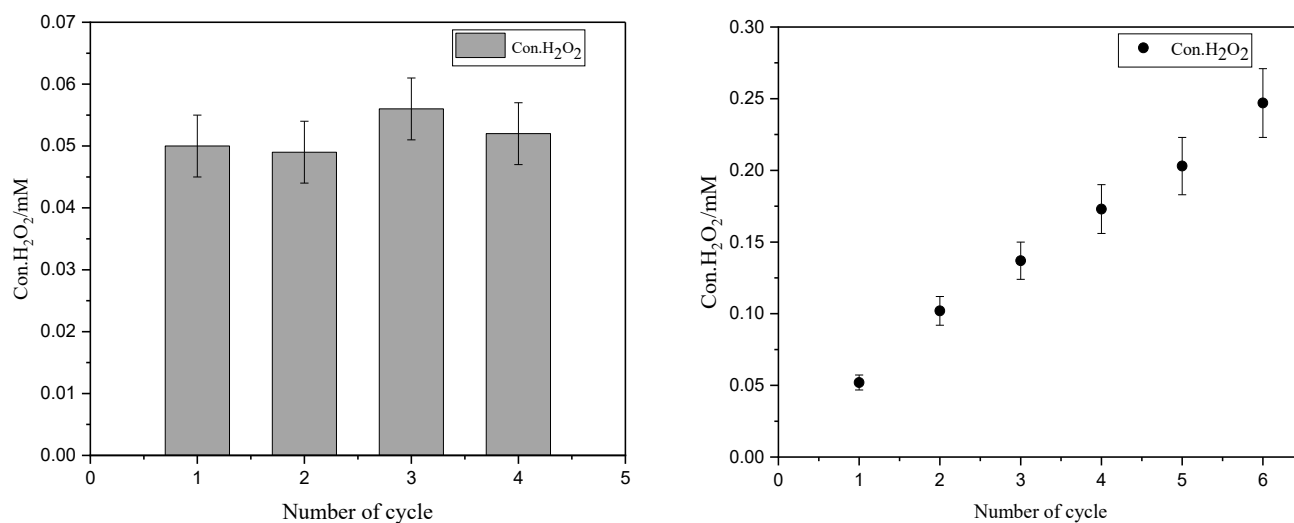


Figure S1. (A) Repeat experiments employing 5 mg barium titanate in PIM-EA-TB in 10% isopropanol/water to generate hydrogen peroxide (5 minutes). The catalyst was recovered, dried, and reused. (B) Build-up of hydrogen peroxide concentration with each experiment.

References

- [1] L.A. Wang, M. Carta, R. Malpass-Evans, N.B. McKeown, P.J. Fletcher, P. Estrela, A. Roldan and F. Marken, *J. Catal.* 2022, **416**, 253–266.