Electronic Supplementary Material (ESI) for New Journal of Chemistry.

Fabrication of a Novel Heteroepitaxial structure from MOF-on-MOF Architecture as a Photocatalyst for Highly Efficient Cr(VI) Reduction

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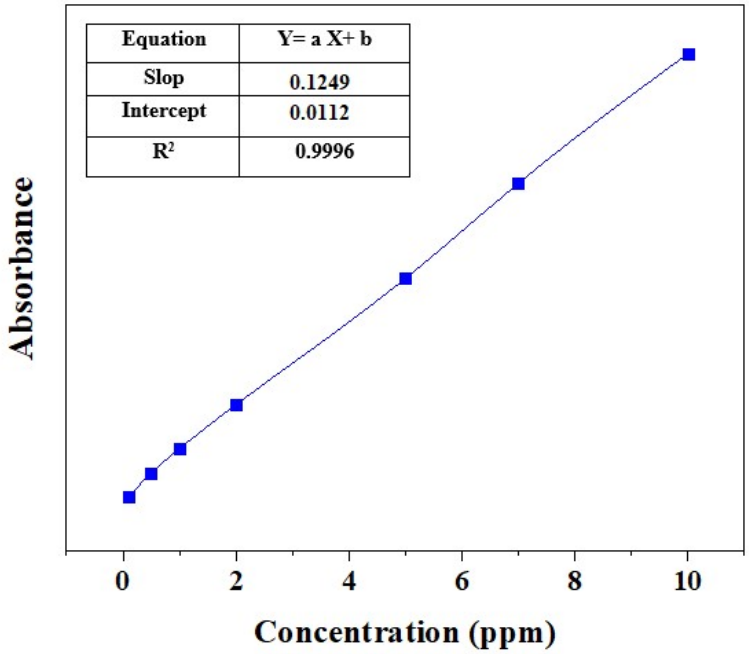


Figure S1. Calibration curve of Cr(VI)-diphenylcarbazide solution.

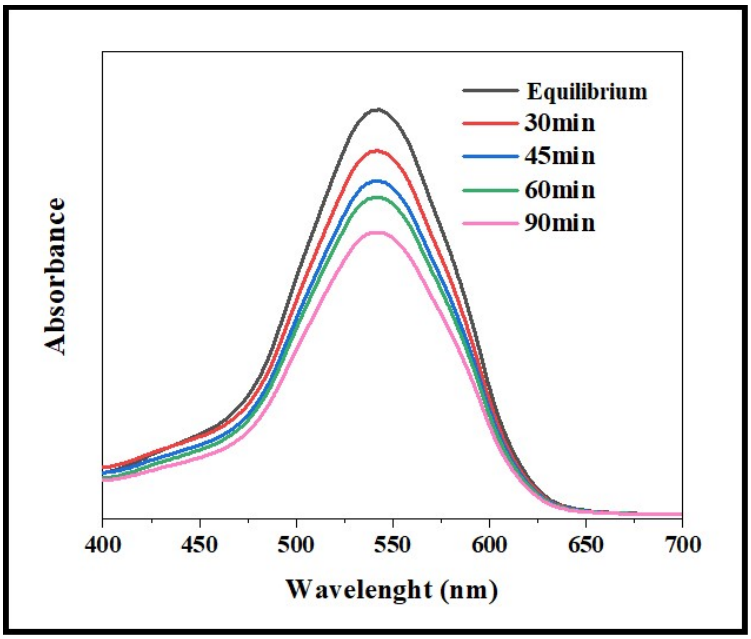
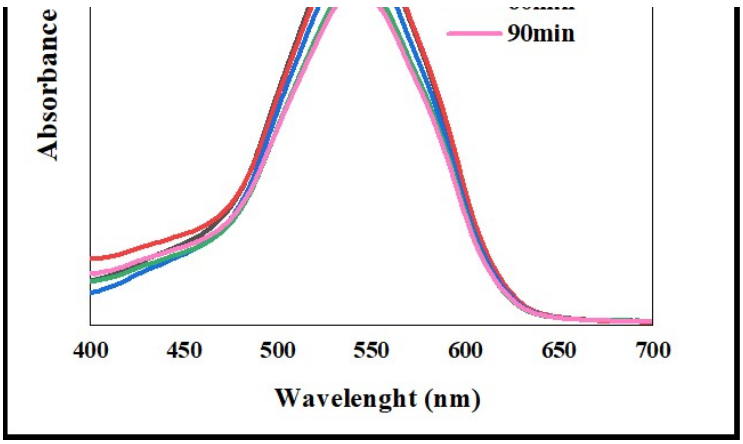


Figure S2. Absorption spectra for photocatalytic reduction of Cr(VI) to Cr(III) catalyzed by Ce-on-Zr-MOF-808(1:1) in the absence of scavenger.

Figure S3. Absorption spectra for photocatalytic reduction of Cr(VI) to Cr(III) catalyzed by Ce-on-Zr-MOF-808(1:1) in the absence of acid.



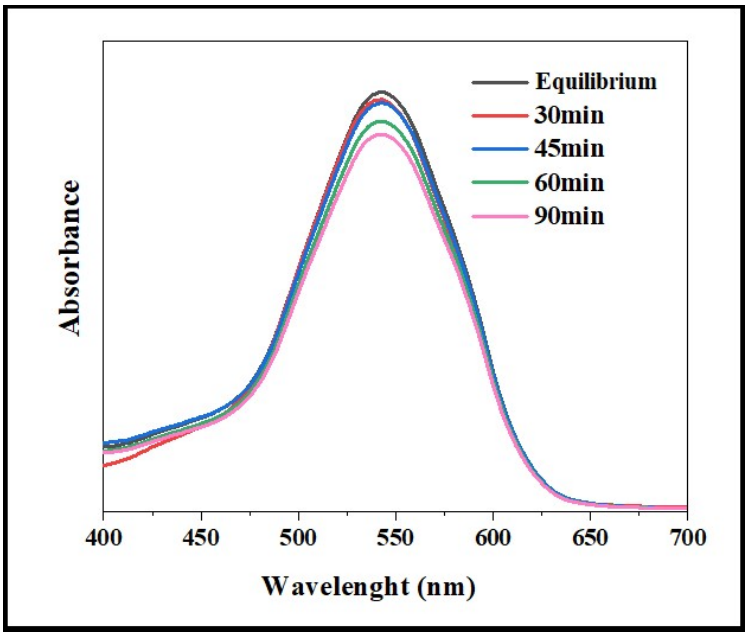


Figure S4. Absorption spectra for photocatalytic reduction of Cr(VI) to Cr(III) catalyzed by Ce-on-Zr-MOF-808(1:1) in the absence of light.

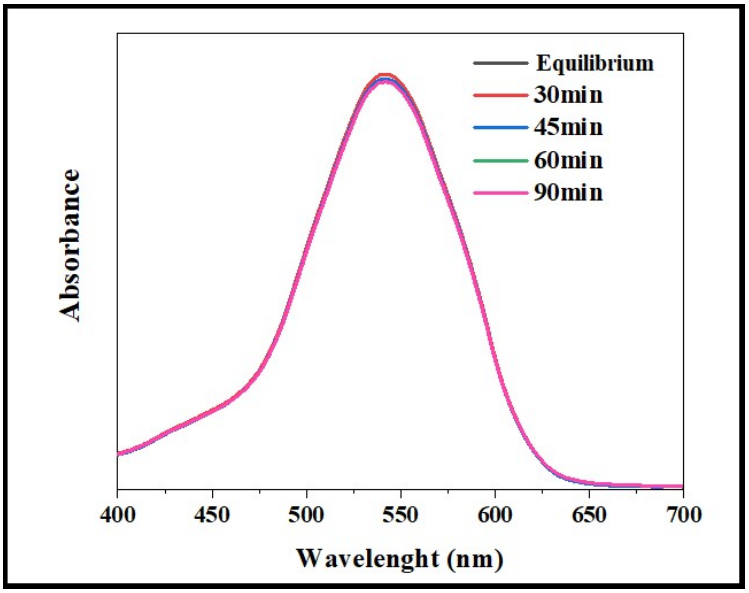


Figure S5. Absorption spectra for photocatalytic reduction of Cr(VI) to Cr(III) catalyzed by Ce-on-Zr-MOF-808(1:1) in the absence of catalyst.

S.No.	Catalysts	Light source	pH	Reduction (%)	Time (min)	Ref.
1	NTU-9/NH_2-MIL-125	UV	3	100	90	**[1]**
2	NH_2-UiO-66	Visible	2	97	80	**[2]**
3	MIL-125(Ti)	Xe-lamp	2	97	60	**[3]**
4	UiO-66(Zr/Hf)	Visible	2	98	120	**[4]**
5	NNU-36	Visible	2.17	95.3	60	**[5]**
6	MoO_3@ZIF-8	Visible	_	96	40	**[6]**
7	PCN-222	Visible	1	100	25	**[7]**
8	g-C_3 N_4 /MIL-53(Fe)	Visible	2	100	180	**[8]**
9	MIL-68(In)-NH_2	Xe-lamp	2	97	180	**[9]**
10	MIL-101(Fe)	Visible	2	100	60	**[10]**
11	Ce-MOF-808	Visible	2	99.6	90	**This work**
12	Ce-on-Zr-MOF-808	Visible	2	100	45	**This work**

References

1. Dhivya, E., et al., *Synthesis of titanium based hetero MOF photocatalyst for reduction of Cr (VI) from wastewater.* Journal of Environmental Chemical Engineering, 2019. **7**(4): p. 103240.
2. Shen, L., et al., *Multifunctional NH 2-mediated zirconium metal–organic framework as an efficient visible-light-driven photocatalyst for selective oxidation of alcohols and reduction of aqueous Cr (vi).* Dalton Transactions, 2013. **42**(37): p. 13649-13657.
3. Wang, H., et al., *Facile synthesis of amino-functionalized titanium metal-organic frameworks and their superior visible-light photocatalytic activity for Cr (VI) reduction.* Journal of hazardous materials, 2015. **286**: p. 187-194.
4. Du, X.-D., et al., *Robust photocatalytic reduction of Cr (VI) on UiO-66-NH2 (Zr/Hf) metal-organic framework membrane under sunlight irradiation.* Chemical Engineering Journal, 2019. **356**: p. 393-399.
5. Zhao, H., et al., *Construction of pillared-layer MOF as efficient visible-light photocatalysts for aqueous Cr (VI) reduction and dye degradation.* ACS Sustainable Chemistry & Engineering, 2017. **5**(5): p. 4449-4456.
6. Zhang, Y. and S.-J. Park, *Facile construction of MoO3@ ZIF-8 core-shell nanorods for efficient photoreduction of aqueous Cr (VI).* Applied Catalysis B: Environmental, 2019. **240**: p. 92-101.
7. Sharma, N., et al., *Highly efficient visible-light-driven reduction of Cr (VI) from water by porphyrin-based metal–organic frameworks: effect of band gap engineering on the photocatalytic activity.* Catalysis Science & Technology, 2020. **10**(22): p. 7724-7733.
8. Tang, H., et al., *AgBr and g-C3N4 co-modified Ag2CO3 photocatalyst: a novel multi-heterostructured photocatalyst with enhanced photocatalytic activity.* Applied Surface Science, 2017. **391**: p. 440-448.
9. Liang, R., et al., *NH2-mediated indium metal–organic framework as a novel visible-light-driven photocatalyst for reduction of the aqueous Cr (VI).* Applied Catalysis B: Environmental, 2015. **162**: p. 245-251.
10. Shi, L., et al., *An amine-functionalized iron (III) metal–organic framework as efficient visible-light photocatalyst for Cr (VI) reduction.* Advanced science, 2015. **2**(3): p. 1500006.