## Accepted Manuscript

### Research paper

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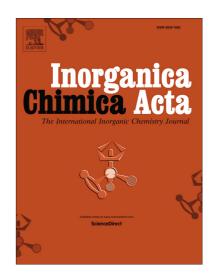
PII: S0020-1693(17)31213-6

DOI: https://doi.org/10.1016/j.ica.2017.10.034

Reference: ICA 17961

To appear in: Inorganica Chimica Acta

Received Date: 3 August 2017 Revised Date: 28 September 2017 Accepted Date: 28 October 2017



Please cite this article as: Z. He, D. Ma, B. Cao, X. Li, Y. Lu, Series of polyoxometalates-based metal-organic frameworks exhibiting high photocatalytic activities for the degradation of methylene blue, *Inorganica Chimica Acta* (2017), doi: https://doi.org/10.1016/j.ica.2017.10.034

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AASRI Procedia 00 (2017) 000-000

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Series of polyoxometalates-based metal-organic frameworks exhibiting high photocatalytic activities for the degradation of methylene blue

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#### Abstract

A series of metal-organic frameworks built from Keggin and Wells-Dawson polyoxometalates were obtained at different under hydrothermal conditions, namely,  $[H_2bimb]_{1.5}[Co(bimb)_{1.5}(H_2O)(BW_{12}O_{40})\cdot 4H_2O$  $[H_2bimb]_{1.5}[Ni(bimb)_{1.5}(H_2O)(BW_{12}O_{40})]\cdot 4H_2O$ (2), $K[H_2bimb][Cu(bimb)(BW_{12}O_{40})] \cdot 2H_2O$  $H_2[Ni(bimb)_2(bimbp)_{0.5}(H_2O)_2][P_2W_{18}O_{62}]_{0.5}$ ;  $3H_2O$  (4) (bimb = 1,4-bis(1-imidazoly)benzene, bimbp = 4,4'bis(imidazolyl) biphenyl). All of the compounds have been structurally characterized by elemental analysis, IR, TG, XRD and single-crystal X-ray diffraction. Compounds 1 and 2 exhibit an interesting network, in which each BW12 anion as double-dentate inorganic ligand link two adjacent Co/Ni-bimb chains to form a wave-type two-dimensional (2-D) plane. Compound 3 displays a 3D structure constructed from  $Cu^{II}-BW_{12}$  sheets and bimb organic ligand with 1D channels. Compound 4 displays a one-dimensional (1D) polypendant chain with P<sub>2</sub>W<sub>18</sub> anions as templates. It is noteworthy that the bimb ligand was in situ transformed into bimbp ligand during the synthesis of 4, and both bimb and bimbp ligands take part in the construction of the structure of 4. Photocatalytic investigation indicates that compounds 1-3 are highly active for the degradation of methylene blue under UV irradiation. In addition, electrochemical properties and electrocatalytic activities of compounds 1-3 have been investigated in detail.

Keywords: Metal-organic framework; Polyoxometalates; Photocatalysis; Electrochemistry; In-situ ligand transformation

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