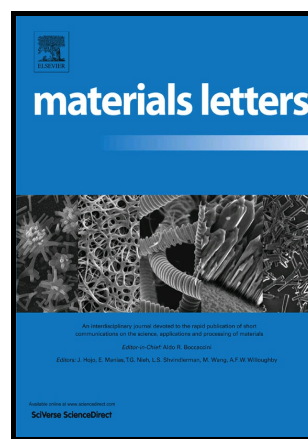


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# Selective catalytic properties of new microporous metal-organic frameworks controlled by their structural topologies

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Abstract:

New metal-organic framework (MOF) materials 1Co [Co(AIA)(bpd)] and 2Co composed of cobalt salt, 5-aminoisophthalic acid (AIA), and 1,4-bis(4-pyridyl)-2,3-diaza-1,3-butadiene (bpd) are successfully synthesized by a temperature-controlled self-assembly reaction. 1Co exhibits a three-dimensional extended porous structure and oxidation catalytic property for the degradation of methyl orange (MO) (conversion 88%), and 2Co is a powder crystal and catalyzes the degradation of malachite green (MG) (conversion 71%). The assembling temperature of MOFs is shown to regulate structures to present not only high activity but also significant selectivity for the degradation of different dyes. Furthermore, microcrystals of 1Co and 2Co with different sizes and morphologies are obtained under various conditions. The results reveal that their catalytic activity for the degradation of organic dyes can be drastically affected by assembly conditions, especially the synthesis time and concentration of reactants. In addition, a detailed possible oxidation catalytic mechanism is proposed. The high flexibility of this strategy will certainly enhance new potential applications of micro/nano-MOFs.

Keywords: Metal-organic frameworks; Crystal structure; Microcrystals; Selective catalysis; Organic dyes

## 1. Introduction

Metal-organic frameworks (MOFs) formed by the assembly of metal ions and ligands have attracted significant interest because of their easily controllable network structures, varied topographies, large specific surface area, high porosity, and low solid density [1-6]. However, their engineering remains a substantial challenge because of weak interactions and subtle factors, which play decisive roles in determining their topologies. The temperature, as an assembly condition, remains a key factor with respect to the crystal structure, morphology, and properties of MOFs. Much research on MOFs remains focused on elucidating the relation between their active functions and

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