

# Photocatalytic Decontamination Of Wastewaters Using Hybrid Organic-Inorganic Magnetic Supramolecular Catalysts



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## INTRODUCTION

Antibiotics, among many other hazardous chemicals, are a silent enemy contaminating most of the fresh and salted water resources worldwide<sup>1</sup>.

Because of their excessive use and the increasing demand of pharmaceuticals worldwide, their concentration in the environment is due to increase, currently being in the range of ppm-ppb, making them hard to detect and degrade by current wastewater treatment technologies, affecting human health and also inducing an indirect antibiotic resistance to microbes<sup>2,3</sup>. One promising solution towards the decontamination of wastewaters is the usage of Layered Double Hydroxides (LDHs) photocatalysts which use solar light as the energy source for the degradation process.

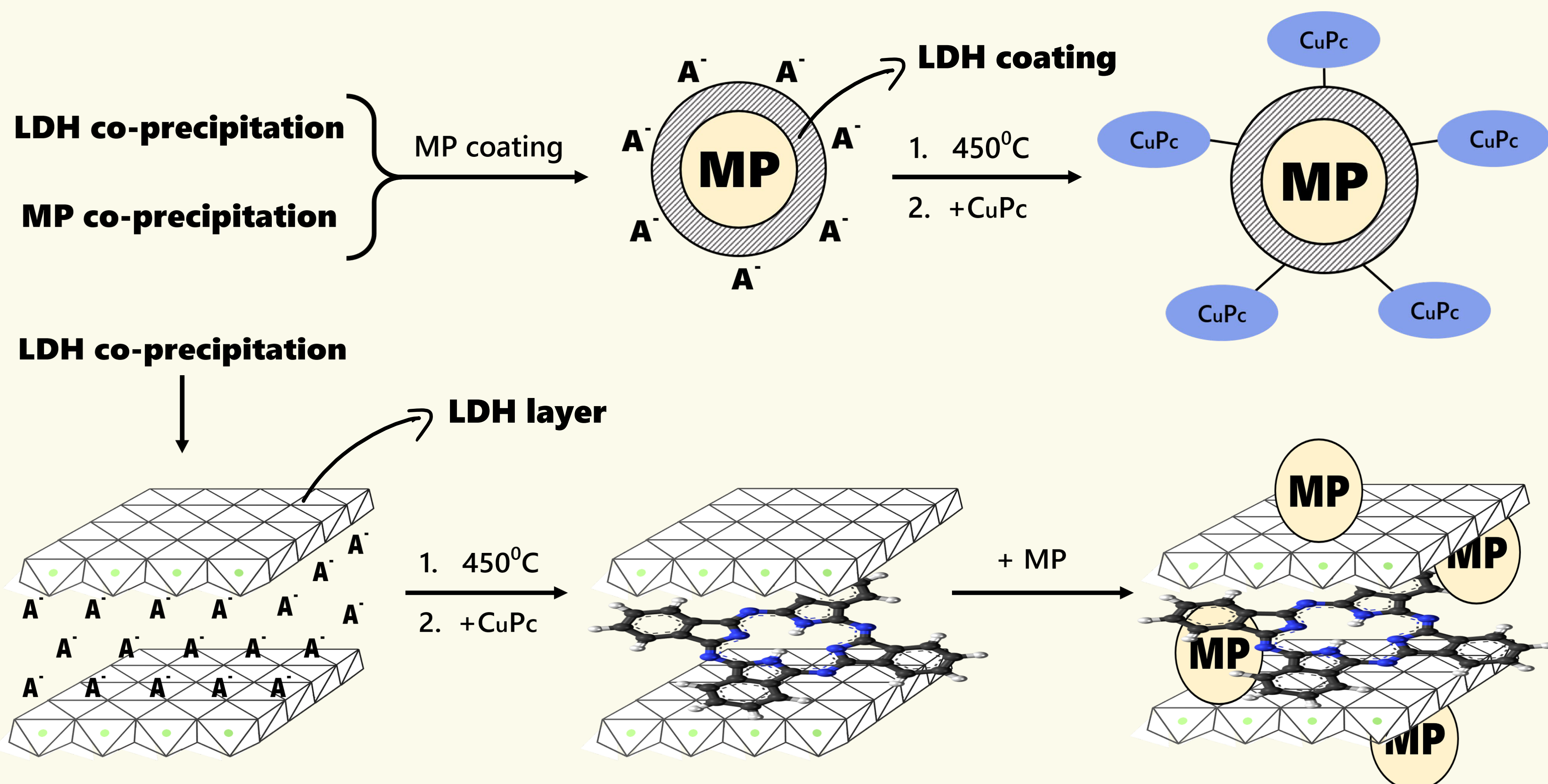
## SYNTHESIS: two strategies

1. Fe<sub>3</sub>O<sub>4</sub> Magnetic Particle (MP) coating with LDH followed by CuPc incorporation (**green series**).

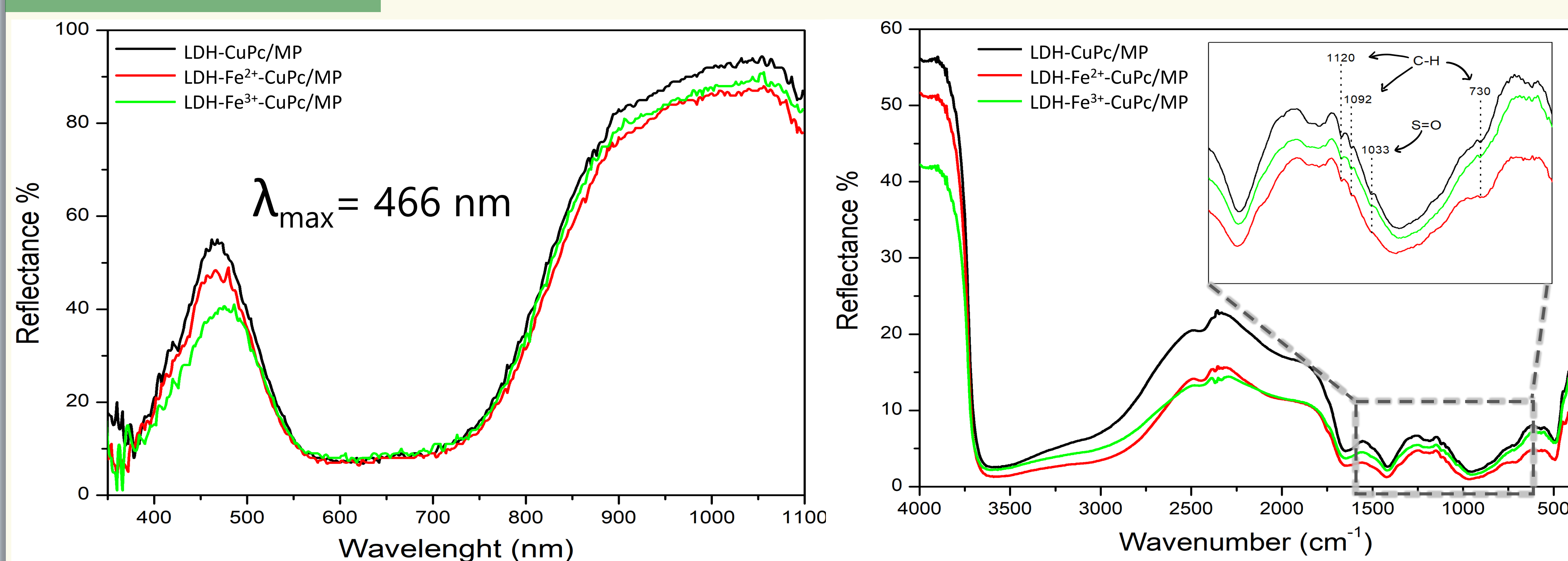
2. LDH interlayer incorporation of CuPc followed by MP deposition (**blue series**).

Three LDHs were synthesized for each strategy:

- ✓ Pure LDH
- ✓ Fe<sup>2+</sup> doped
- ✓ Fe<sup>3+</sup> doped

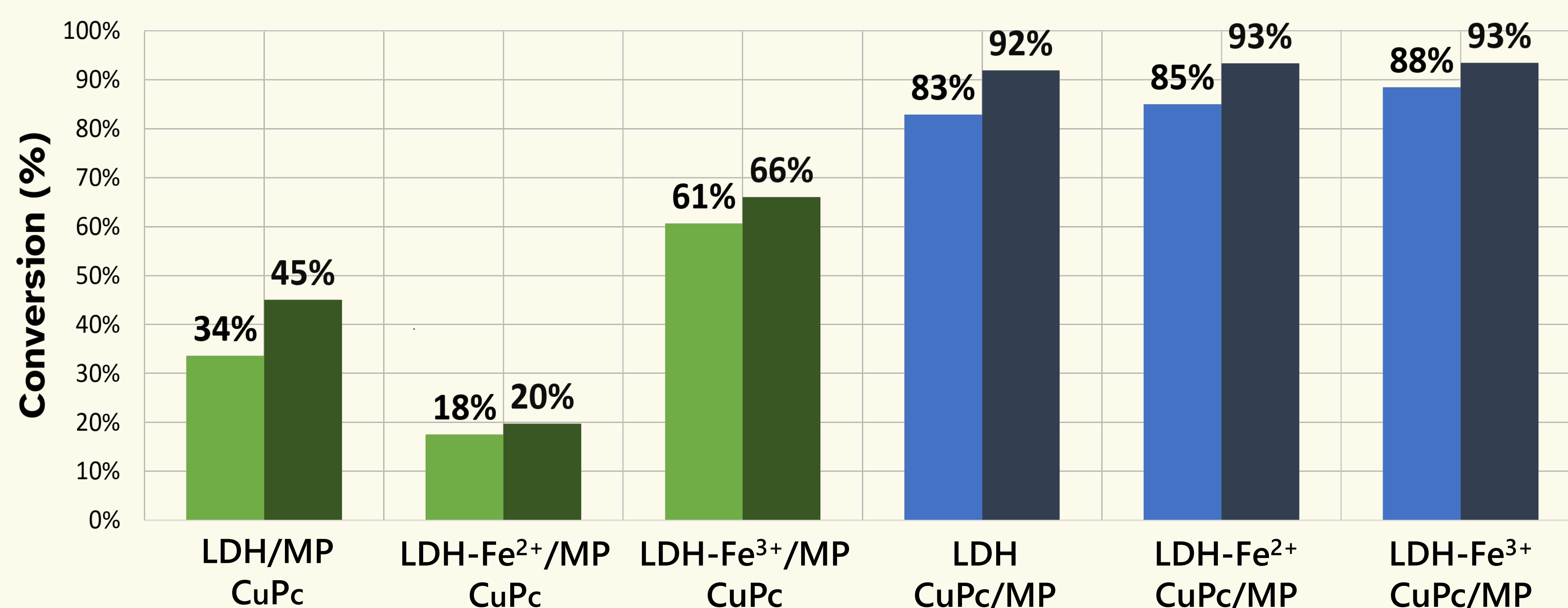


## RESULTS



DR-UV-Vis

DRIFT



30 mg catalyst + 7.5 mL [Oxacillin] = 0.15 mM → sunlight simulator, 1h-2h

\*Oxacillin solution was made from commercial drug

## CONCLUSIONS

- Simple, convenable synthesis.
- Characterization data shows the incorporation of CuPc.
- Very promising results, especially for the LDH-CuPc/MP series of catalysts (**blue series**).

## PERSPECTIVES

- Further irradiation at fixed wavelengths.
- LDH/MP synthesis and tests – LDH vs LDH-CuPc.
- Reaction kinetics and degradation mechanism proposal.
- Influence of dopant ions and MPc (CuPc vs FePc vs NiPc).

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