

## Summary of results obtained during the FRENCHBIC mobility grant

Title: Photocatalytic reduction of carbon dioxide by polypyridine copper complexes

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To ensure the reliability of our setup for photocatalytic studies, the initial phase of this work focused on reproducing the results reported by Marc Robert et al.<sup>[1]</sup> using CuQTPY (Figure I-A). The obtained results (Figure II-A) demonstrated that the catalyst exhibited the same behaviour under identical experimental conditions, achieving a maximum TON of around 12,000.

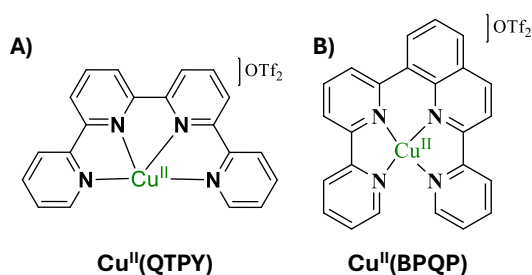


Figure I. Complexes studied

Next, we investigated the newly synthesized pyridine-based copper complex, CuBPQP (Figure I-B), under the same conditions to assess how ligand modification influences the photocatalytic reduction of CO<sub>2</sub> in this family of complexes. The results (Figure II-B; in red) demonstrated that CuBPQP effectively reduces CO<sub>2</sub> to CO and that the catalysis occurs through a heterogeneous mechanism, leading to the formation of nanoparticles. This is evident from the continuous increase in TON(CO) over time.

To confirm the heterogeneous nature of the catalysis, we conducted a mercury poisoning test by adding an equimolar amount of Hg (1:1) to the catalytic system. As expected, the catalytic activity was completely suppressed (Figure II-B; in blue), providing strong evidence that CuBPQP operates via a nanoparticle-driven heterogeneous pathway.

Due to time constraints, we were unable to perform additional analytical studies to characterize the nanoparticles formed.

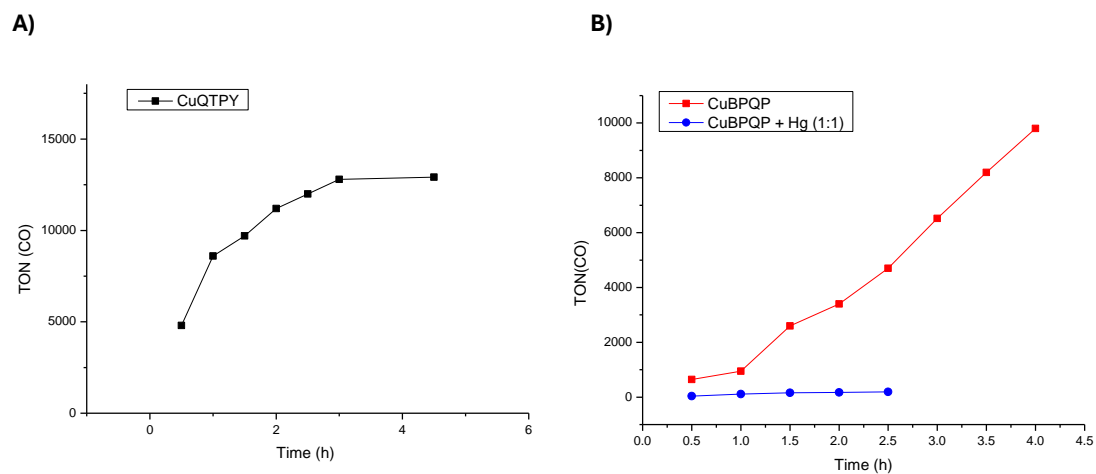


Figure II. Results obtained under same experimental conditions reported<sup>[1]</sup>

### References:

Guo, Z., Yu, F., Yang, Y., Leung, C. F., Ng, S. M., Ko, C. C., ... & Robert, M. (2017). Photocatalytic conversion of CO<sub>2</sub> to CO by a copper (II) quaterpyridine complex. *ChemSusChem*, 10(20), 4009-4013