Carbon Monoxide Releasing Polymeric Micelles (CORMi)

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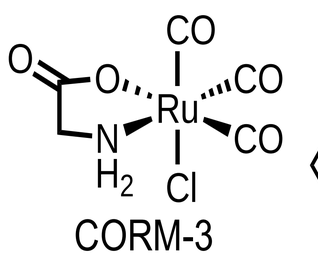
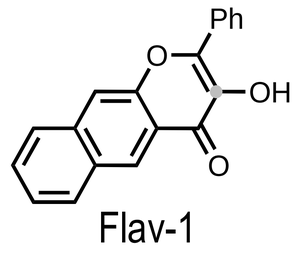
Motivation

- Carbon Monoxide (CO), generally known for its toxicity, is produced endogenously by the enzyme heme oxygenase (HO)[1]
- CO has show positive effects in the immune, respiratory, reproductive, gastrointestinal, kidney, and liver systems[2]
- Given the therapeutic potential of CO, molecules that release CO have been designed and named **CORMs**



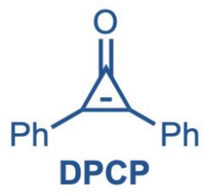
CORM-3

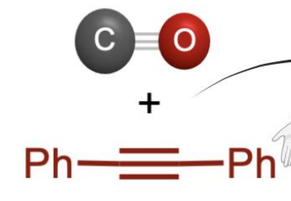


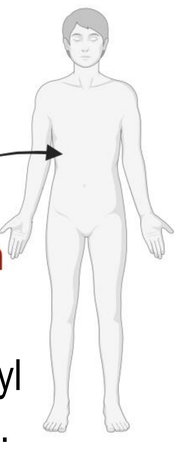
Flav-1

State-of-the-art CORMs use toxic metals, are not inherently triggerable

Goal

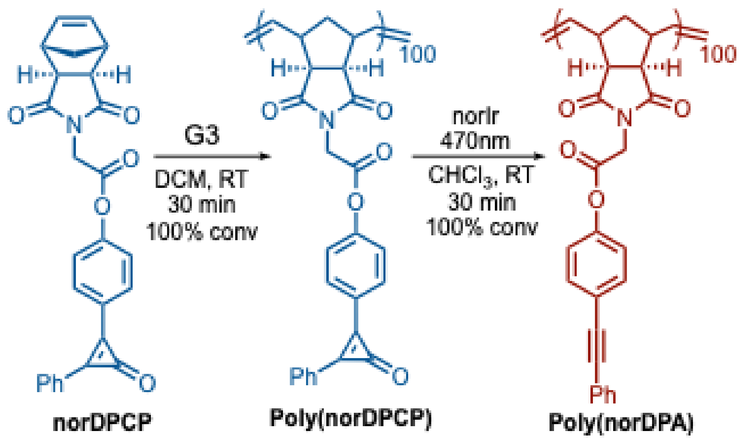


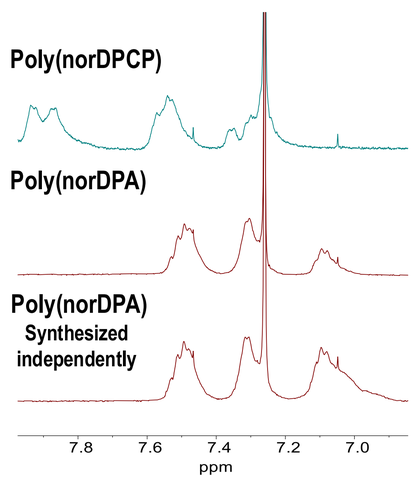




Deliver a CORM based on diphenyl cyclopropenone using a polymeric micelle.

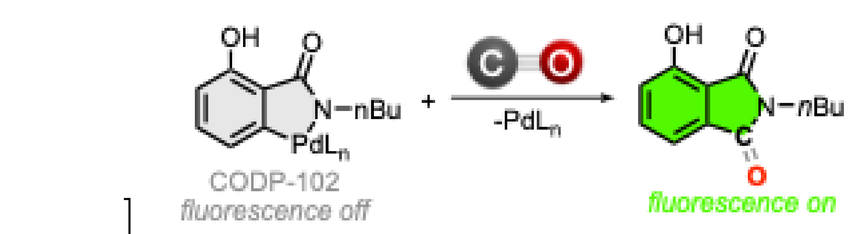
Polymer Synthesis and Irradiation

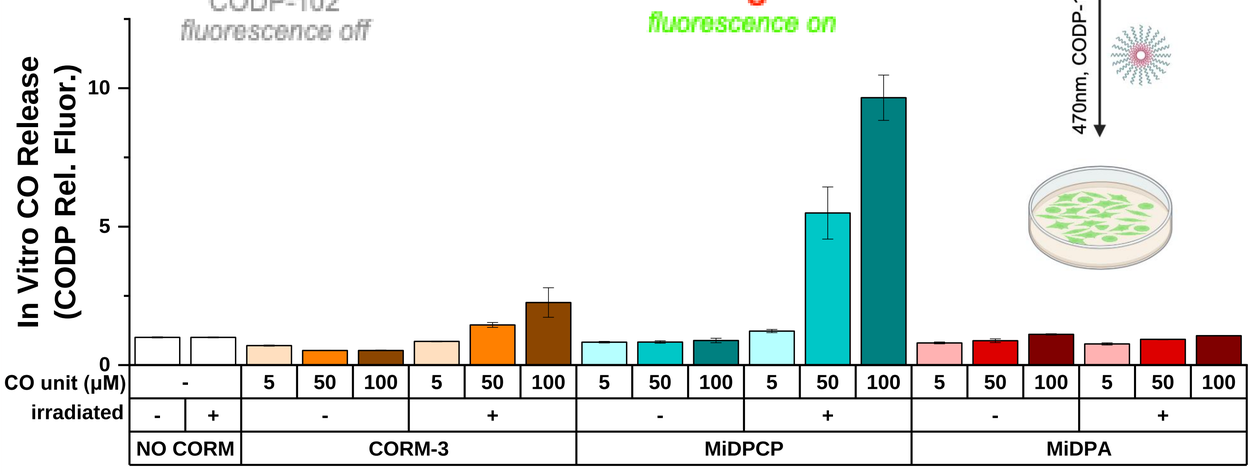




100% conv, Poly(norDPCP) to Poly(norDPA) shows full CO release

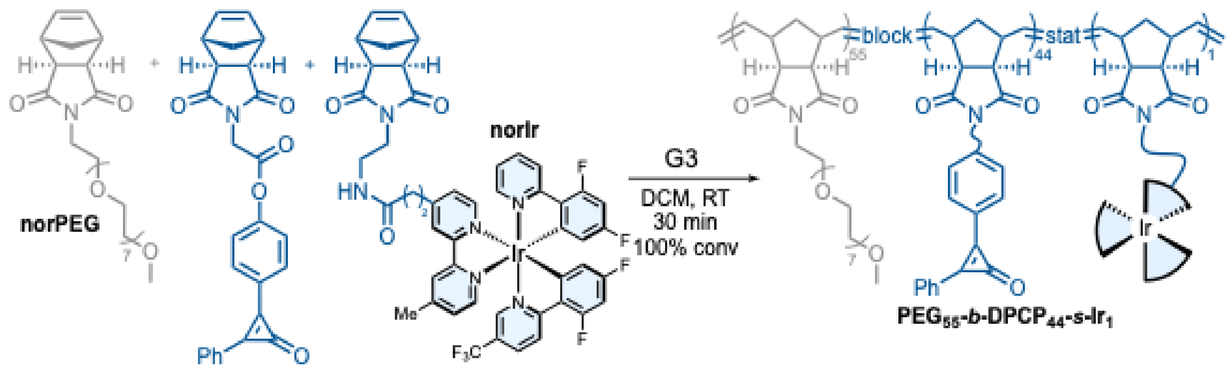
In-Vitro CO release Cell Assay





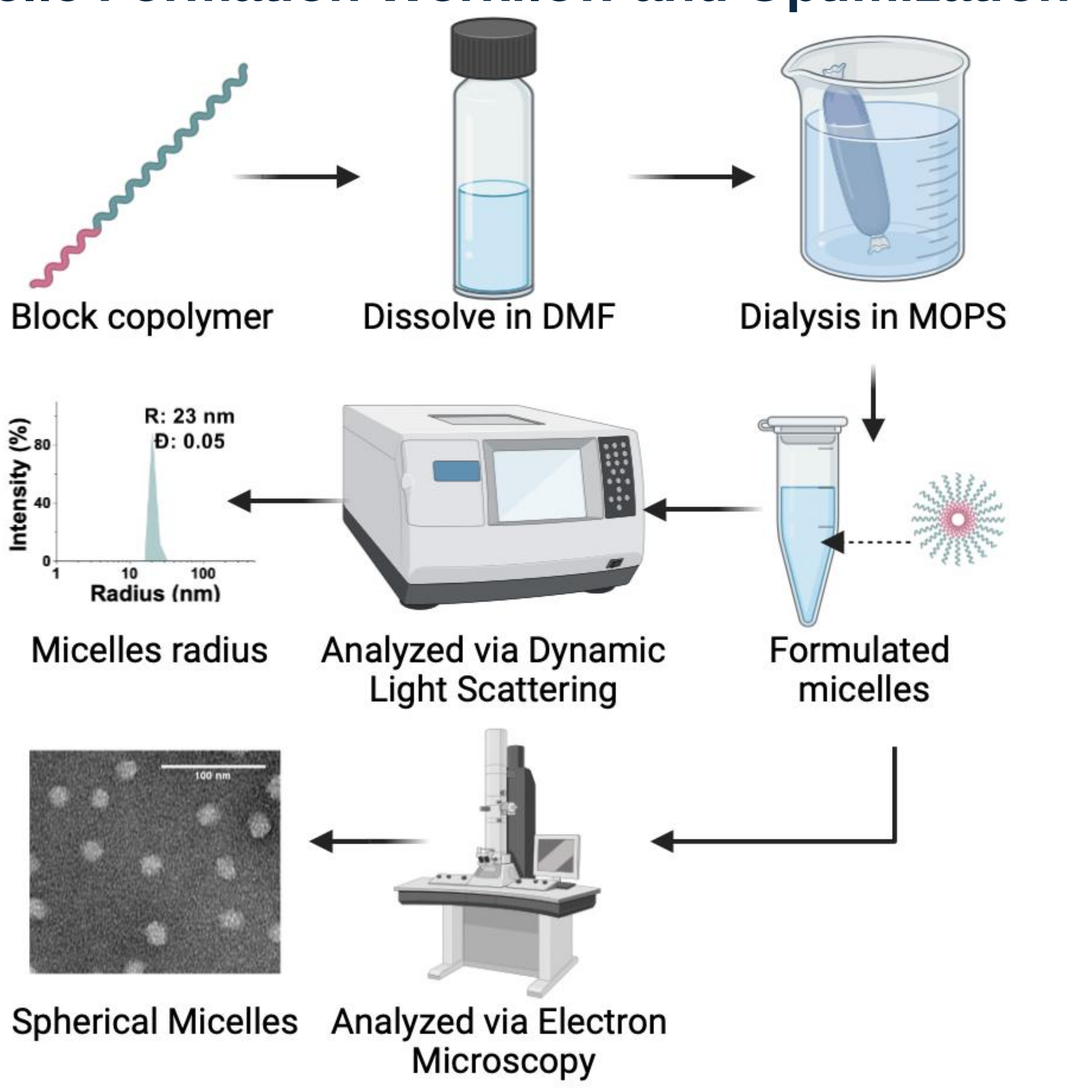
MiDPCP efficiently releases CO as compared to controls

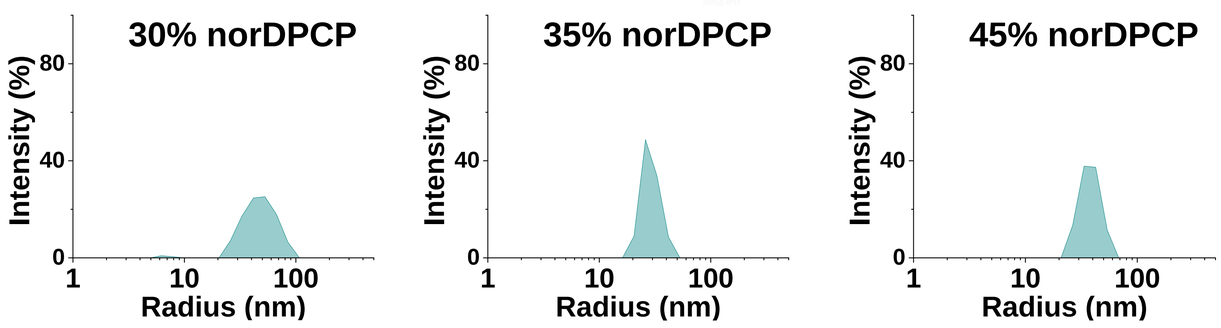
Diblock Copolymer Synthesis



Diblock Polymerization of norPEG and norDPCP with norIr (Photocatalyst)

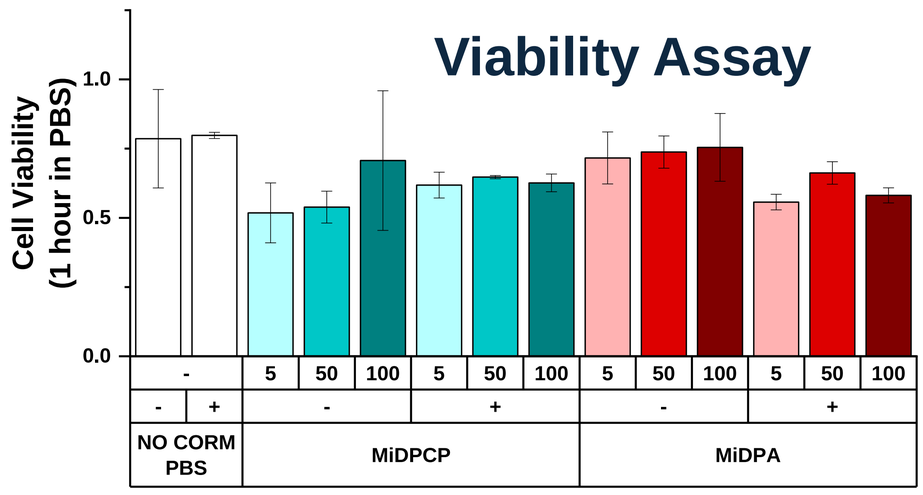
Micelle Formation Workflow and Optimization

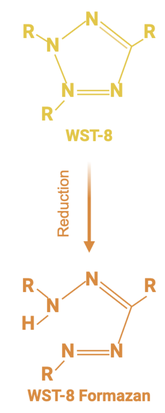




45% norDPCP gives spherical micelles of 23nm radius

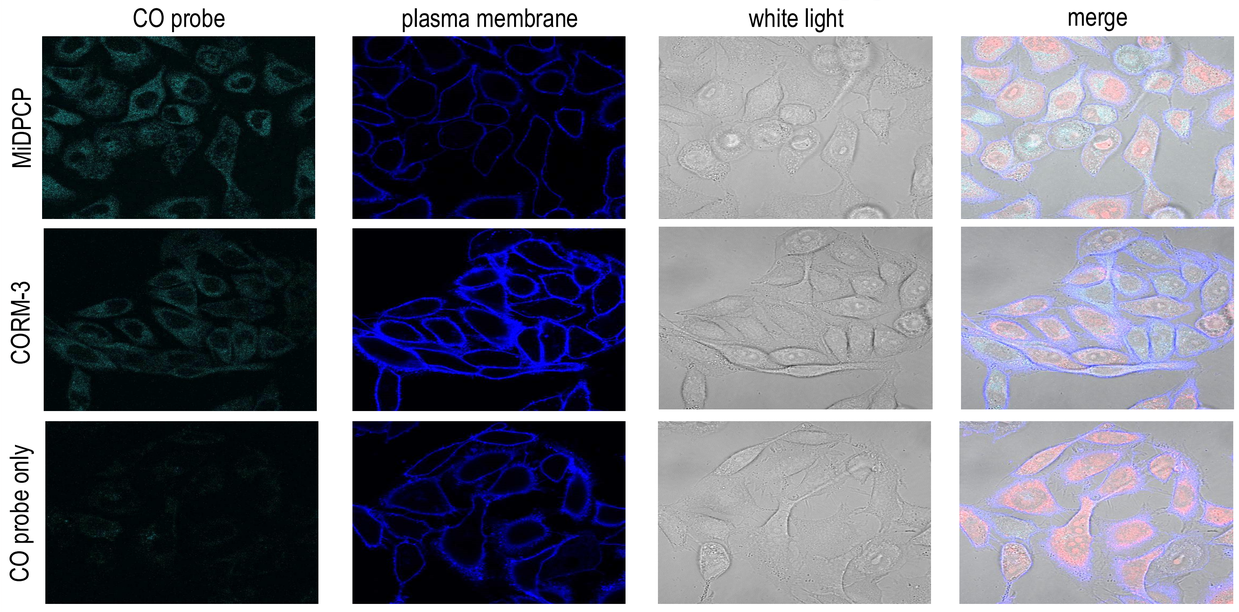
Viability Assay





MiDPCP is not toxic to A549 cells

Confocal Microscopy



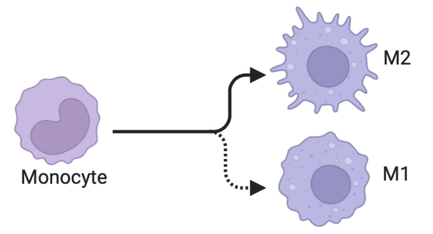
CO is internalized in A549 cells

Summary

MiDPCP is a promising CO releasing polymer with low toxicity and more triggerable and controllable CO release.

Future Work

Monitor for anti inflammatory signs using macrophages



Acknowledgements

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References

1. Wang, B.; Otterbein, L. E. In *Wiley Series in Drug Discovery and Development*, First ed.; Wang, B., Ed.; John Wiley and Sons: Hoboken, New Jersey, 2022.
2. Ryter, S. W. *Arch. Biochem. Biophys.* **2019**, *678*, 108186.