BEYOND HOMOGENEOUS: ELECTROCATALYTIC CO_2RR WITH POLYMERIZED COBALT COMPLEXES

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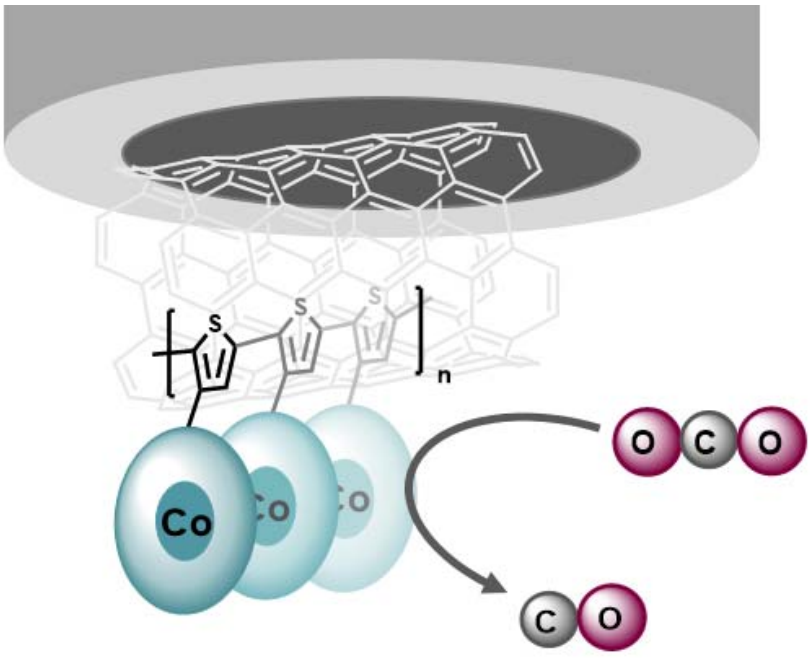
Since the CO_2 reduction reaction (CO_2RR) has the potential to reduce the carbon dioxide content in the atmosphere while producing precursors or fuels, the development of new high-performance CO_2RR catalysts is desirable. To optimize the catalytic system, research utilizing molecular metal complexes as homogeneous catalysts has advantages. Those catalysts provide a well-defined active site that can lead to rational catalyst design, e.g., by selective tailoring of the ligand. Through anchoring the molecular catalysts to surfaces, the benefits of homogeneous catalysis are combined with the benefits of heterogeneous catalysis (e.g., easy catalyst separation/recycling, long lifetime). [1]

Here, the development of a heterogeneous molecular cobalt catalyst is presented. A cobalt complex with a thiophene moiety was synthesized, which enables oxidative electrochemical polymerization. The catalytic activity under homogeneous conditions was determined. Subsequently, the complex was electropolymerized on graphite surfaces and the resulting electrodes were applied in electrocatalytic CO_2RR.



[1] D. Grammatico, A. J. Bagnall, L. Riccardi, M. Fontecave, B. Su, L. Billon, *Angew. Chem. Int. Ed.* **2022**, *61*, DOI 10.1002/anie.202206399.