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DONOR FLEXIBLE SPECTATOR LIGANDS ANCHORED Pd (II) AS ELECTROCATALYSTS FOR CO_2 REDUCTION

The utilization of CO_2 into synthesis gas as a substitute of processing fossil fuel to produce hydrocarbons is a sustainable and carbon neutral energy technology. The electrochemical reduction of CO_2 into a mixture of CO and H_2 at commercial scale still requires efficient electrocatalyst. In this perspective, a series of new palladium complexes[1-3] with general formulas, $[Pd(L^1)(Y)]Y$, $[Pd(L^2)(Y)_2]$ and $[Pd(L^3)(Solvento)]$ Where L^{1-3} are different donor flexible spectator ligands and Y/ Solvento are actor ligands, were utilised as active electrocatalysts for the conversion of CO_2 into synthesis gas. All compounds were successfully characterized by various physical methods of analysis such as proton and carbon NMR, FTIR, CHN and single crystal XRD. The redox chemistry of palladium complexes toward carbon dioxide activation suggested an evident CO_2 interaction with each Pd(II) catalyst. The best electrocatalytic activity for CO_2 reduction into synthesis gas under acidic condition of trifluoracetic acid (TFA) was obtained with a minimum overpotential of 0.11 V, maximum turnover frequency (TOF) of 461 s^{-1} and 81% FE of CO. These pincer scaffolds can be stereo-chemically tuned with its exploration with earth abundant first row transition metals for further improvement in CO_2 reduction chemistry.

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