Spectroelectrochemical and IR-photocatalytic investigations of manganese based CO_2-reduction-catalysts

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The application of spectroelectrochemical (SEC) and IR-photocatalytic methods for the investigation of electrocatalytic CO_2-reduction is a powerful tool to gain excellent insight into the mechanisms of such processes. We report the IR-spectroscopical investigation of different manganese-based CO_2-reduction-catalysts under reaction conditions. The ligand-framework of these catalysts, based on pyridine-thiazoline or pyridine-oxazoline networks, is easily to be obtained. [1,2,3] Catalytic systems similar to the investigated catalysts provide the electrochemical and photochemical ability to convert carbon dioxide into different products. [2,4,5] In this project cyclovoltammetric experiments show further evidence for the catalytic behaviour due to increased catalytic current under CO_2-atmosphere. Cyclovoltammetric and amperometric experiments in combination with IR-spectroscopic measurements have been conducted under argon and under CO_2 saturated conditions, respectively. Furthermore, in photocatalytic IR measurements the behaviour of these manganese- based catalysts could be examined as well. Here a Tensor 27 from BRUKER is connected to a micro annular gear pump, purging the irradiated reaction solution through a liquid cell, while a series of IR spectra is recorded. Various intermediates have been observed during both IR-SEC and IR-photocatalytic measurements for different catalysts and have been assigned with the help of DFT-calculations. [4]

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