Carbon Cycling and CO$_2$-Catalysis

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Beside Carbon Dioxide Capture and Storage (CCS), an investigation of CO$_2$ as a resource is important. Goal of the two approaches CCU (Carbon Dioxide Capture and Utilisation) and CCC (Carbon Dioxide Capture and Cycling) is the production of methane or methanol from captured carbon dioxide.

In combination with the oxyfuel path, an “ideal” modern power plant technology, by the combustion process almost pure CO$_2$ is released. The purity of the gas is the great advantage giving good prospects for subsequent substantial recycling and recuperation. Hydrogen is available from water electrolysis, the part of electrolytic oxygen gives opportunities for a substitution of oxygen necessary for the oxyfuel process. From the electrolytic hydrogen and the captured carbon dioxide of the power plant, methane or methanol is then produced by catalytic reactions. Both are important materials for a wide spectrum of further applications, for example in chemical industry or as fuel for cars or fuel cells. Another important opportunity is the storage of energy by methanol. Prerequisite for these reactions of CO$_2$ is the application and optimization of catalysts. The chair of applied Physics of the BTU Cottbus works on new materials for catalysts and their optimization for the catalytic reactions from CO$_2$ and H$_2$ to methane or methanol. In this contribution, we present results in terms of materials for novel catalysts, their surface characterization and their catalytic efficiency.

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