Transforming CO_2 and H_2 into Renewable Chemicals and Fuels

Research Group of Christoph Rameshan

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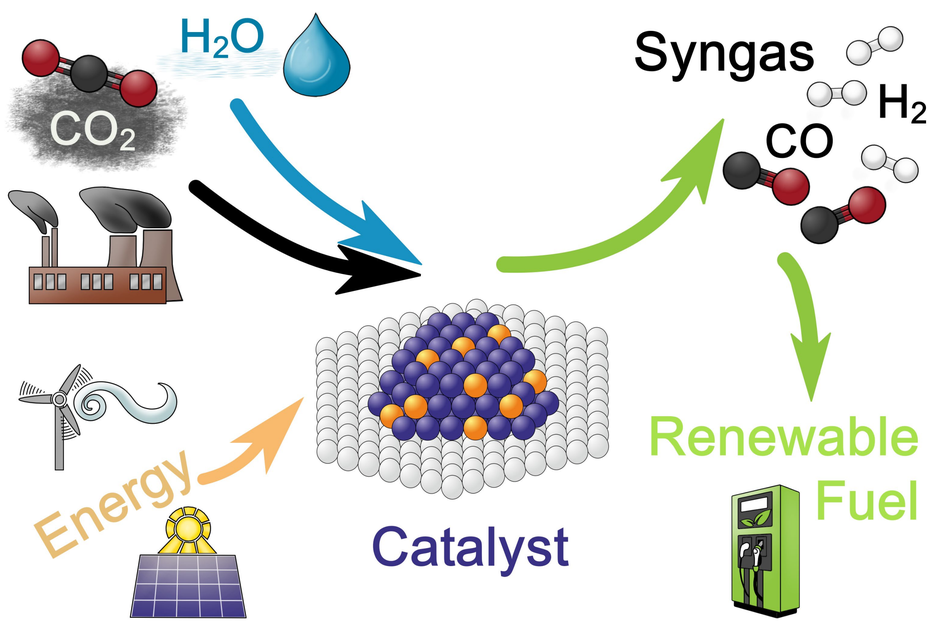
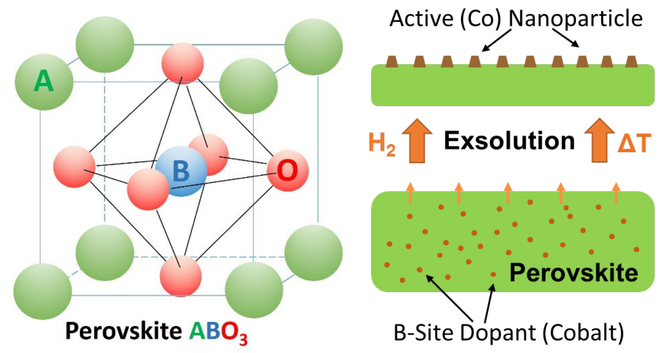
Development of New Catalytic Systems

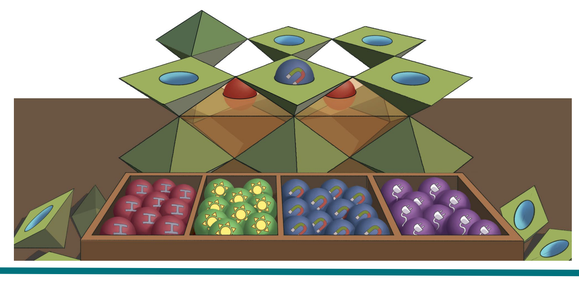


We develop and test new catalytic materials based on **complex oxides**. They facilitate a **rational design approach**, which cuts down development time and increases efficiency.

In recent studies, we have shown the applicability of these catalyst not only for **CO_2 utilisation** but also to reactions useful for **H_2 storage** and **CH_4 conversion**.

In the end, our novel materials could help mitigate climate change by **transforming greenhouse gases** and creating a **carbon neutral circular economy.**



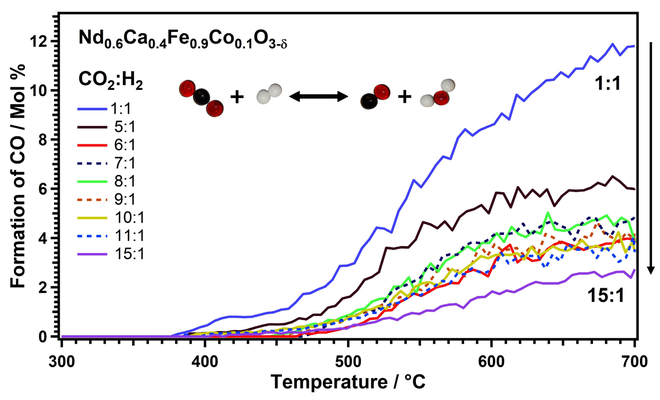


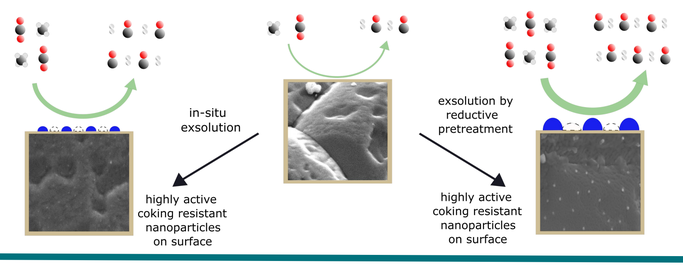
Material Characterisation: In-situ Studies and Theory Predictions

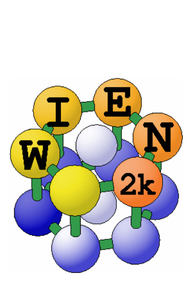
For a rational catalyst design, it is crucial to obtain insights into how desired reactions work on a molecular level. To achieve this, we utilise a multitude of **high-end, state-of-the-art in-situ/operando methods,** both in our laboratories and at **international research facilities.**

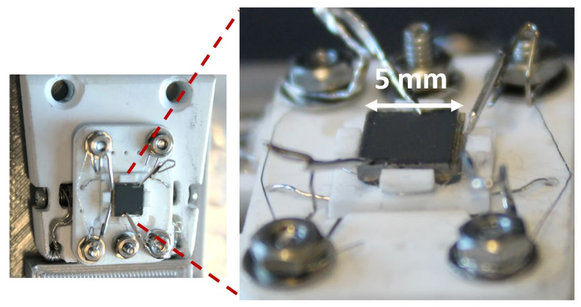
Combined with predictions via theoretical models, a direct correlation of catalyst structure and its reactivity is possible.

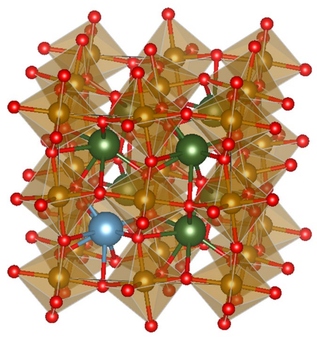
In the past years, we expanded our research focus to electro-catalytic processes, particularly focused on CO_2 reduction and green H_2 generation.

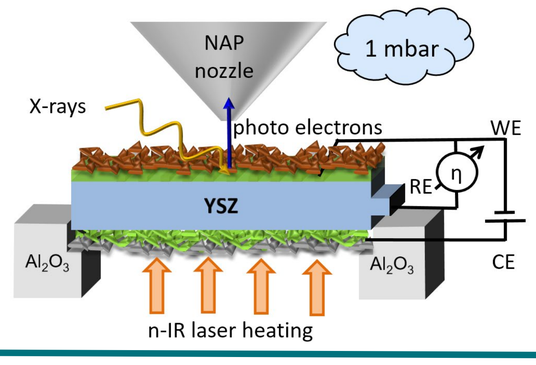




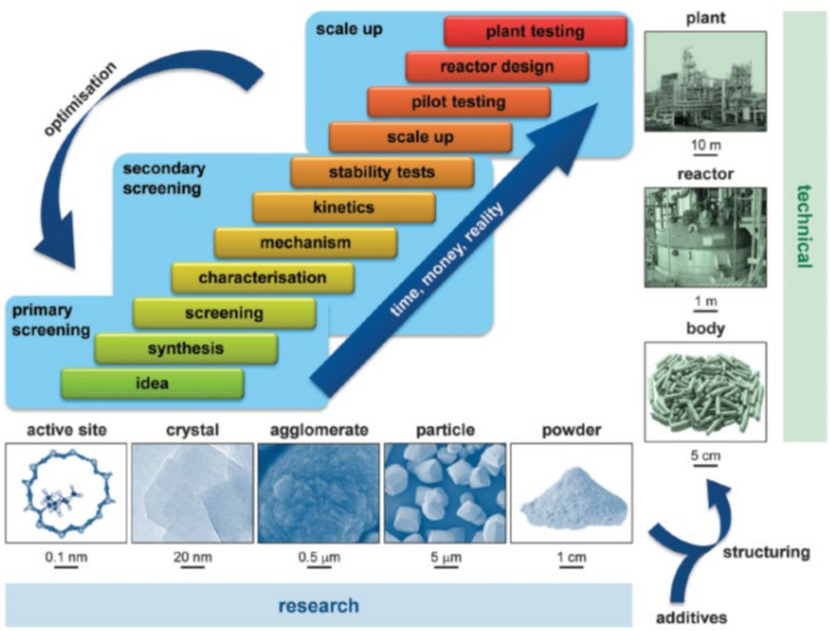


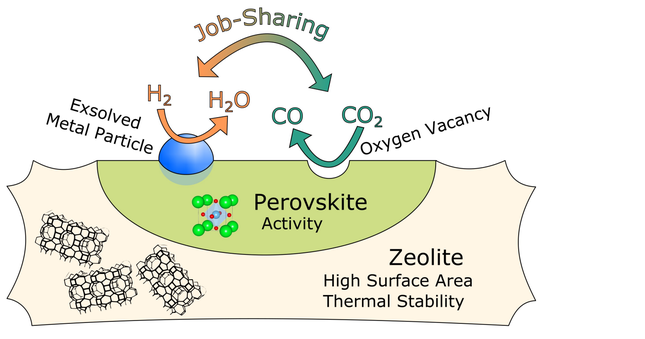


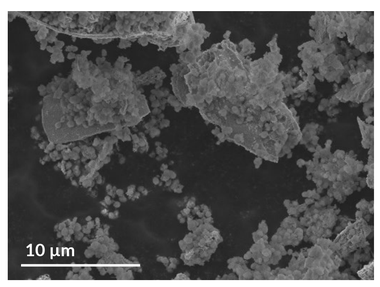




Transfer Developed Catalysts into Industrial Applications







To successfully achieve global impact, the catalysts we developed need to be **implemented into existing industrial processes**. Therefore, the catalytic systems need to be optimised to guarantee **long-term stability** and **low cost** for industrial application.

We are currently researching ways to **combine our catalytic highly active materials with backbone materials already used in large- scale processes.**

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