We found a way to improve novel catalysts for utilizing CO_2 and CH_4

Impact of nanoparticle exsolution on dry reforming of methane: Improving catalytic activity by reductive pre-treatment of perovskite-type catalysts

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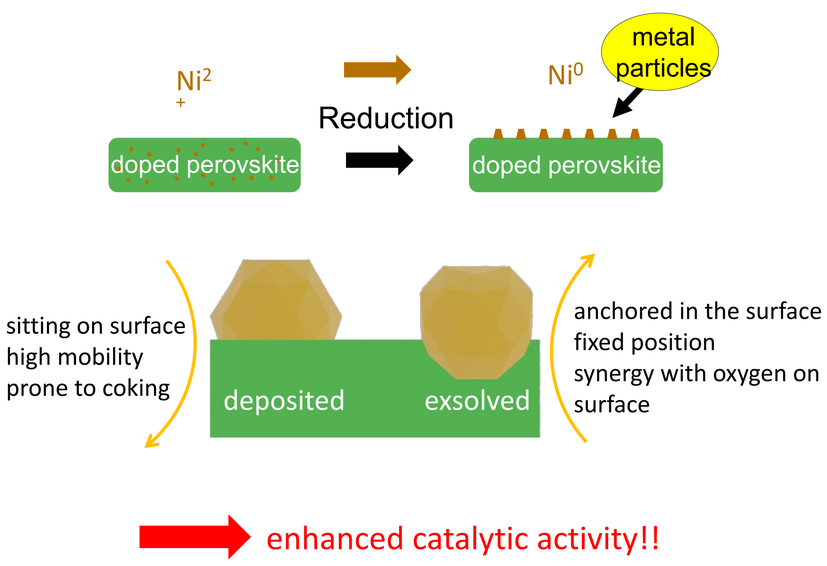


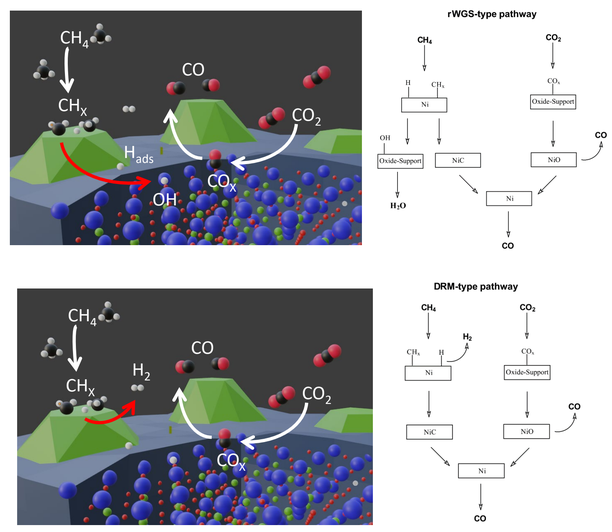
Introduction

Perovskite-type catalysts proved to be effective towards the **utilization of CO_2** and other greenhouse gases.

These materials achieve this by forming **stable nanoparticles** on their surface in a process known as **exsolution**.

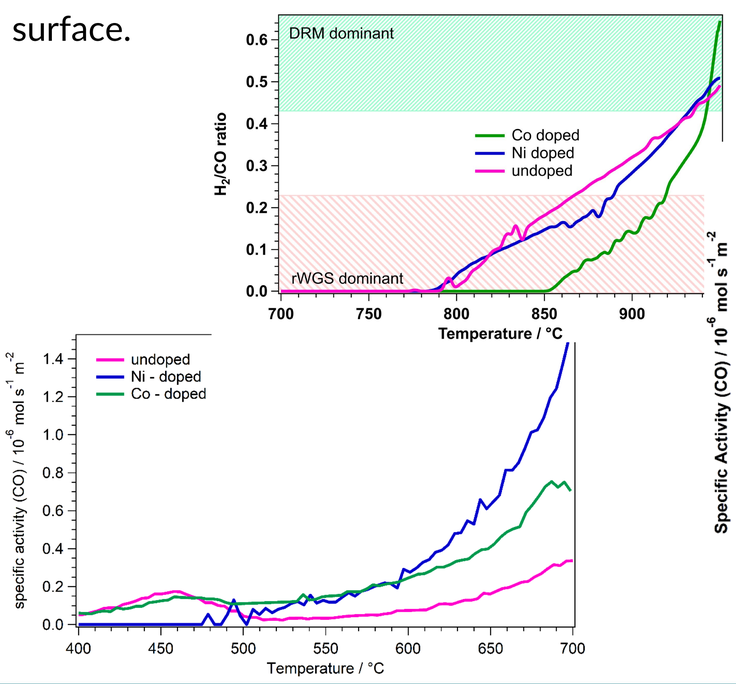
In this study a perovskite-type catalyst was developed with a **rational design approach** and tested for Dry Reforming of Methane, which converts **two potent greenhouse gases** into the **basic building block of the chemical industry**.

$$CH_4 + CO_2 \rightleftharpoons 2\,CO + 2\,H_2$$



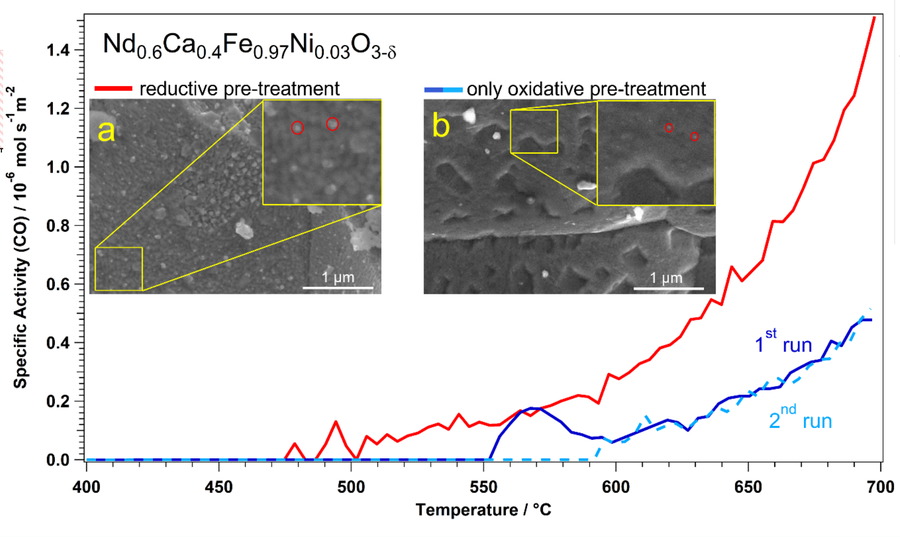
Design of the catalyst

We **modified the material** by **introducing doping elements** which form nanoparticles on the surface.



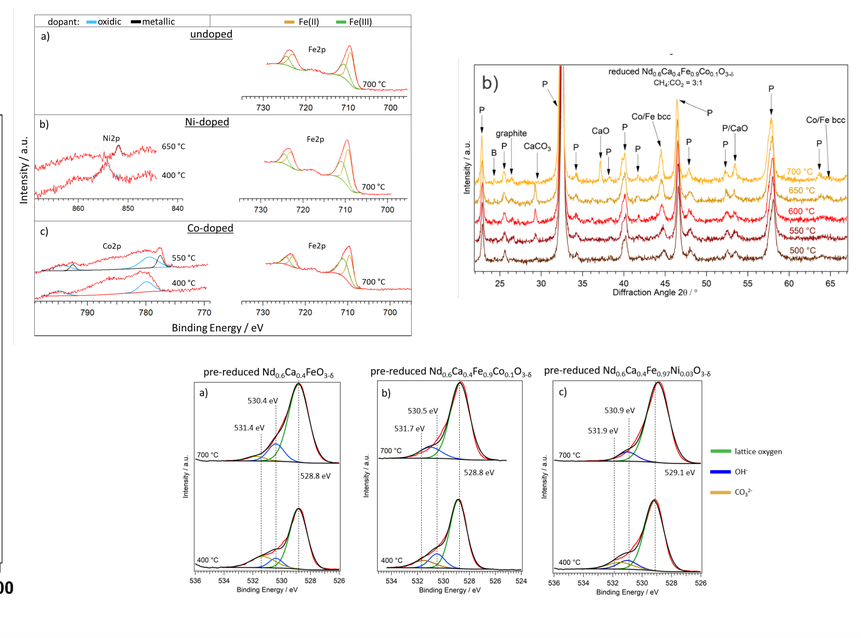
Improvement of the catalyst

As the exsolution is a **reduction** an increase in the reductive power, by **implementing a pretreatment**, leads to an increase in activity.



Investigation of the catalyst

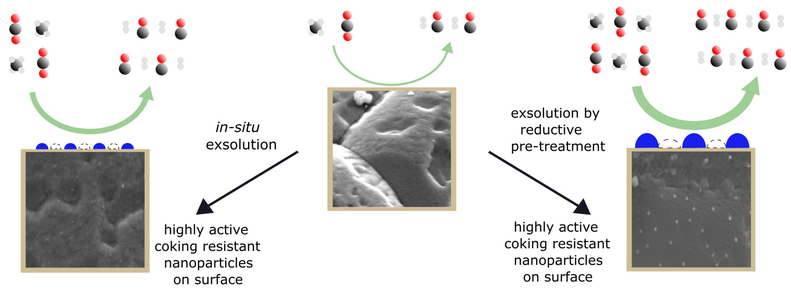
Several techniques were used to characterize the behavior of the catalyst **during the reaction**.



Conclusions

Perovskite-type catalysts can be utilized for dry reforming of methane.

A rational design approach can be used to tailor the materials to the reaction.



A reductive pretreatment leads to an additional increase in catalytic activity.

The materials show a mechanistic switch with increasing temperature.

13 CLIMATE ACTION

Take a picture to find out how **we devolved new catalysts for Methane Dry Reforming**