**Chemical Looping Oxidative Dehydrogenation (CL-ODH)**

Development of a Transformational Process to Valorize Ethane and/or Naphtha to Ethylene through Material Development, Kinetic and Process Analyses

**Thermochemical H₂O/CO₂ Splitting**

Design and Development of Metal Oxides for Efficient Production of Syngas and H₂/CO

**Chemical Looping Processes**

Offer Efficient, Cost-Effective, Environmentally Friendly and Sustainable Options for Fuel-Valorization and Energy-Conversion Routes

**Chemical Looping Air Separation (CLAS)**

Combination of Experimental and DFT Techniques to Optimize Metal Oxides to Efficiently Separate Oxygen from Air

**Outlook**

Chemical Looping Processes offer efficient, cost-effective, environmentally friendly and sustainable options for fuel-valorization and energy-conversion routes. Chemical Looping Air Separation (CLAS) combines experimental and DFT techniques to optimize metal oxides for efficiently separating oxygen from air. Thermochemical H₂O/CO₂ splitting involves designing and developing metal oxides for efficient production of syngas and H₂/CO. Insight into reaction mechanisms investigates reaction mechanisms of chemical looping processes via molecular beam mass spectrometry (MBMS) in collaboration with Prof. Phil Westmoreland.