

CARE-O-SENE: Collaborating on catalysis for cleaner skies

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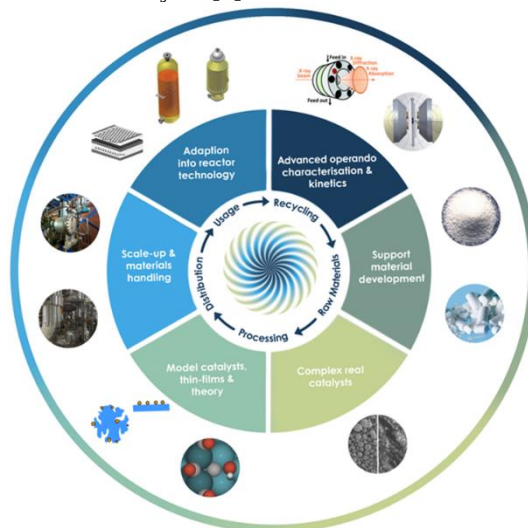
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One of the key pathways to decarbonise the hard-to-abate aviation sector is the production of sustainable aviation fuels (SAF) via Power-to-Liquids (PtL) [1]. Cobalt Fischer-Tropsch catalysts are particularly of interest for use in PtL as they have higher selectivity to straight chain paraffins, and low CO₂ selectivity. Areas of improvement for cobalt catalysts, especially when using expensive renewable sources of syngas are ensuring that conversions are high (high water tolerance) and selectivity to the desired molecules are targeted (correct alpha value or chain growth probability) [2].

To accelerate the state of science and scale-up of cobalt PtL catalysts, an international consortium between South Africa and German academic and industrial partners, called CARE-O-SENE was established in 2022 (Fig 1). Here, we showcase selected aspects of our collaborative work to understand, develop & scale-up new cobalt catalysts. We demonstrate how the use of advanced *in-situ* characterisation techniques at realistic conditions, theoretical modelling as well as techno-economic analysis can help understand the impact of catalysts applied in PtL processes. We further demonstrate how a risk mitigated scale-up process, is used to produce the catalyst up to a tonne scale, followed by testing in a hydrodynamically representative, semi-commercial demonstration reactor (300b/d). The scale-up of this state-of-the-art PtL catalyst, amongst the best in its class, is seen as an enabler for Sasol's ambitions to target the SAF market. The work also demonstrates the power of industry-academia collaboration to advance FT technology.

Figure 1: The CARE-O-SENETM research cycle [3]



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