

Utilisation of hybrid plasma-catalysis for net zero applications

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The achievement of Net Zero requires a wide range of new chemical processes and approaches. This presentation will explore the use of the following main aspects:

- Methane combustion activated by non-thermal plasmas
- Water Gas Shift activated by non-thermal plasmas
- CO₂ utilisation

Hybrid heterogeneous catalyst-plasma systems represent an important advance in catalytic reaction engineering as they combine the advantages of having fast and low temperature reactions from atmospheric non-thermal plasma and high product selectivity from the catalyst. They have been successfully applied in a large number of reactions, from VOC oxidations and automotive catalysis to reforming and hydrogenation reactions. Herein, we will examine their use in the combustion of methane, conversion of CO₂ to value added products and low temperature water gas shift. Both thermally activated reactions and those under non-thermal plasma control will be investigated and compared using in-situ spectroscopic and structural methods.