

Catalytic coatings for non-thermal plasma reactors

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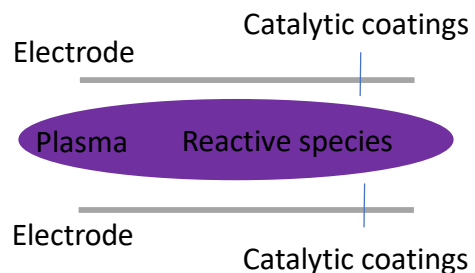
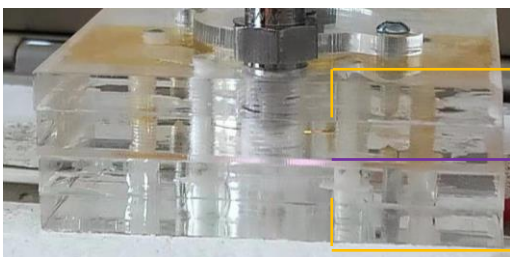
Introduction

Plasma-catalysis is a promising research area which has attracted a lot of attention recently. The combination of non-thermal plasma and heterogeneous catalysts has shown great potential in many reactions including CO₂ valorization, nitrogen fixation and methane reforming. To achieve better synergy, catalysts in the right form should be introduced into the plasma reactor. In most of the reported cases, catalysts in pellet form were packed into the plasma reactor. Catalysts coatings could be a better option for plasma catalytic reactors, especially the microplasma reactor.

Project summary

This project will investigate the catalytic coatings in a non-thermal plasma reactor to improve energy efficiency, conversion or selectivity. Different coating techniques will be explored including dip coatings, spray coating, chemical vapour deposition etc. Catalysts material types and thickness or the coated layer and position of the coating inside the reactor will be studied. Characterization of the developed coatings will be conducted with different methods. Plasma generation, production of reactive species and their interaction with the catalytic coatings will be taken into consideration.

Finally, the developed coatings will be tested in different plasma reactors with chemical reactions. This includes using our newly developed microplasma reactors for the conversion of methane and CO₂. Students undertake this project will mainly work on experimental study of coating methods and techniques. Collaboration and assistance will be provided by friendly and enthusiastic colleagues in the group.



Project goals

- Develop method and techniques for catalytic coatings in plasma reactors
- Coating a thin catalytic layer and optimize it for plasma introduced reactions
- Investigate the effect of the catalytic coating through practical reactions in plasma reactors.

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