

Non-thermal plasma assisted N-fixation

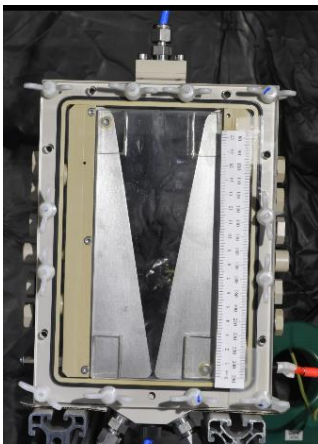
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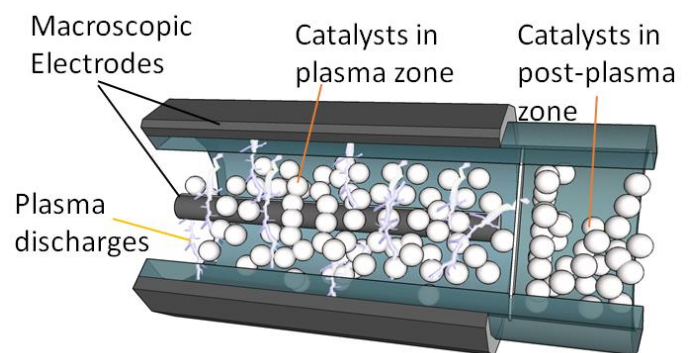
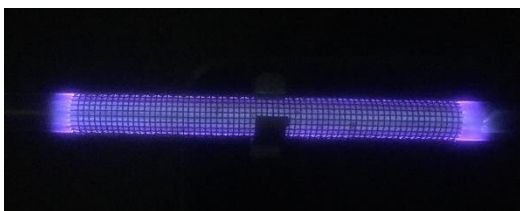
Introduction

Nitrogen is one of the most important elements to the living organism on earth. Although abundant in atmospheric air, it normally cannot be directly used before the N-fixation process. Conventional N-fixation process (Haber-Bosch) requires high temperature and pressure for reaction, consuming 1-2% of the world's total energy production and emits 300 million metric tons of CO₂. Non-thermal plasma has a great potential to fix nitrogen at low temperature and atmospheric pressure, providing new opportunities for small-scale, on-site production of Nitric acid or ammonia.

Project summary



This research will start from developing non-thermal plasma reactors for ammonia/NO_x synthesis. Based on existing reactor models such as Dielectric Barrier Discharges, Gliding Arc discharge and so on, plasma reactor will be developed specifically for ammonia/NO_x synthesis at low temperature and atmospheric pressure. Plasma-catalysis will also be investigated to improve the energy efficiency and selectivity. More importantly, reaction mechanism behind the plasma-assisted ammonia synthesis will be investigated.



Project goals

- Improve the energy efficiency of plasma assisted process for ammonia/NO_x production (state of art: 20-30 MJ/mole for NH₃ and 2.8 MJ/mole for NO_x)
- Further explore the mechanism of the targeted plasma-catalytic reaction.
- Develop the prototype of the small-scale N-fixation plant for potential applications such as on-site fertilizer production.

Contact information

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