



Alexandre Lebouvier

27 years-old



French

Plasma Processes / Plasma Physics / Computational Fluid Dynamics

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I completed my Ph. D. in Sophia Antipolis (France) in collaboration with the car-maker Renault. The goal of my research was to determine the feasibility of a plasma technology to replace a reforming catalyst onboard in order to meet the upcoming European environmental regulations.

I currently work on the development of plasma processes, both experimentally and theoretically. These investigations meet several disciplines such as electrical, chemical and mechanical engineering as well as computer science.

CURRENT RESEARCH

Topic

Investigation of a very high pressure, low current and high voltage plasma batch reactor.

Methodology

- Experimentally: Technical challenges and feasibility studies, parametric studies on pressure, gas mixture ratios, current, interelectrode gap. GC analysis of outlet compounds.
- Theoretically: Development of kinetic and 3D fluid dynamics models (CFD) to give a better understanding of the coupled physical phenomena.
- Comparison Exp. / Mod. results

Applications

Microelectronics:

Fluorocarbon synthesis

Environmental:

CO₂ splitting

Energy:

Hydrocarbon synthesis by Fischer-Tropsch process

UKZN main Publications

- A. Lebouvier, S. A. Iwarere, P. d'Argenlieu, D. Ramjugernath, and L. Fulcheri, *Assessment of Carbon Dioxide Dissociation as a New Route for Syngas Production: A Comparative Review and Potential of Plasma-Based Technologies*, *Energy & Fuels* **2013**, 27 (5), 2712–2722.
- A. Lebouvier, S. A. Iwarere, D. Ramjugernath and L. Fulcheri, *3D magnetohydrodynamic modelling of a dc low-current plasma arc batch reactor at very high pressure in helium*, *Journal of Physics D: Applied Physics* **2013**, 46 145203.
- A. Lebouvier, S.A. Iwarere, D. Ramjugernath and L. Fulcheri, *Investigation of tetrafluoromethane as a plasma gas in a very high pressure/low current dc batch reactor by means of 3D MHD modelling*, *Journal of Physics D: Applied Physics* **2013**, 46 355206.

Past Researches

- A. Lebouvier, F. Fresnet, F. Fabry, V. Boch, V. Rohani, F. Cauneau and L. Fulcheri, *Exhaust gas fuel reforming of Diesel fuel by non-thermal arc discharge for NOx trap regeneration application*, *Energy & Fuels* **2011**, 25 (3), pp 1034-1044.
- A. Lebouvier, F. Cauneau and L. Fulcheri, *2D Axisymmetric coupled CFD-kinetics modelling of a nonthermal arc plasma torch for diesel fuel reforming*, *Energy & Fuels* **2011**, 25 (7), pp 2833-2840.
- A. Lebouvier, C. Delalondre, F. Fresnet, V. Boch, V. Rohani, F. Cauneau and L. Fulcheri, *Three-Dimensional Unsteady MHD Modeling of a Low Current - High Voltage Non-Transferred DC Plasma Torch Operating With Air*, *IEEE Transactions on Plasma Science* **2011**, 39(9), pp. 1889-1899.

Future Interests

I'd like to extend my fluid dynamics modeling skills out of the plasma physics field, for industrial purposes as those encounter in fields such as aeronautics, automotive, pollution, fire, etc.

Extra Interests

Hiking, Surfing, Travels, Sports (Squash, Running, Volley-ball, Basket-ball)