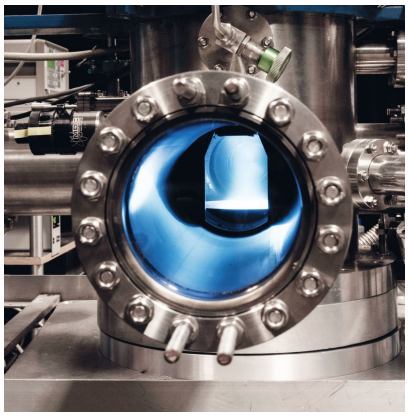
Created in 2009, ChIPS is a joint laboratory between UMONS (University of Mons) and the Materia Nova Research Center. With about forty members, including 3 professors among whom 2 are Research Associates from the FNRS, it hosts about ten PhD students and is currently conducting 7 large-scale research projects.

ChIPS develops researches focusing on the study of the interface between cold plasmas and matter. Mastering the whole range of the technological chain from the design of electrical sources for the generation of plasmas to the controlled synthesis and/or surface modification of materials, the laboratory currently develops three main lines of research, namely:

- The synthesis of functional, organic (plasma polymers) or inorganic coatings.
- The conversion of gases (CO_2 reforming into fuels or valuable chemicals, N_2 fixation for the synthesis of fertilisers and synthesis of H_2 from hydrocarbon feedstocks).
- The synthesis and engineering of nanomaterials at the atomic scale.



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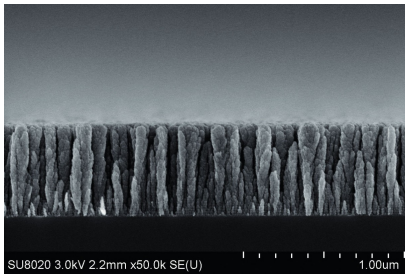
For example, ChIPS is currently involved in the “Nitroplasm” research project as part of the “Excellence of Science” (EOS) programme co-financed by the FNRS and the FWO. This project is dedicated to the study of plasma-based technologies for the development of environmentally friendly nitrogen fixation processes. Another EOS project, PLASynthH_2, has recently (2022) been obtained and will allow ChIPS to develop further the researches on the plasma-based green hydrogen synthesis from hydrocarbon.

The laboratory is also contributing to the “Virusurf” project, launched in 2020 as part of an Exceptional Research Projects (PER) call from the FNRS in the context of the COVID-19 sanitary crisis. “Virusurf” targets the development of antiviral surfaces developed by plasma technologies in collaboration with ULB (Université libre de Bruxelles) research teams. Another FNRS founded project, “Solution”, aims to develop innovative plasma-based technologies for the synthesis of nanoparticles via the deposition of material onto liquid surfaces.

ChIPS researches have already led to industrial applications. Its close and long-standing collaboration with AGC Glass Europe has contributed to the commercialization of the insulating windows based on low-emissivity filters. In addition, its recent researches in plasma-based CO_2 reforming are now mature enough to be transferred at an industrial pilot scale.

The laboratory also contributes to the Walibeam platform. This platform, supported by the Walloon Region and several Walloon industrial groups, focuses on ion irradiation to modify the surface of materials in order to provide new surface properties without an additional coating. This technology has many potential applications, for example in glass and chemical industries.



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Future Perspectives

ChIPS research has a bright future in view of the challenges ahead. At the level of fundamental research, the laboratory uses sophisticated plasma characterization tools to better understand and design plasmas that become more and more complex and specific for increasingly precise applications (gas conversion using transient plasmas, deposition of complex coatings onto powder substrates using pulsed plasmas…).

In terms of applied research, ChIPS aims, based on the developed researches and proof-of-concepts, to convince industry to dare to invest in plasma technologies. The initial financial effort is certainly substantial, but it is worth it at a time when the trend towards electrifying industrial processes is growing. Indeed, because of their specificities, plasma technologies are certainly key players for a wise and efficient utilisation of the intermittently produced renewable electricity. A very good omen for ChIPS!

Chemistry of Plasma Surface Interactions – ChIPS
University of Mons
Place du Parc, 23 – 7000 Mons
Tel.: +32 (0)65 55 49 55
Email: rony.snyders@umons.ac.be
https://chips.umons.ac.be/index.php/fr/