PhD POSITION

ZIEGLER-NATTA CATALYSIS: POLYMERIZATION & ADVANCED CHARACTERIZATION FOR INNOVATION
(36 months starting from September 2016)

This research will be carried out in the team "Chemistry and Processes of Polymerization" of the C2P2 laboratory in Villeurbanne (C2P2: Chemistry Catalysis Polymer Processes - UMR 5265 - CNRS - CPE Lyon – University Claude Bernard; http://www.c2p2-cpe.com/) in the frame of a French-Swiss ANR-PRCI project MrCAT (Magnetic Resonance Spectroscopy (NMR, EPR) for Polymerization Catalyst). Other partners of the MrCAT project are: ISA laboratory Villeurbanne (solid state NMR; Dr Guido Pintacuda) and ETH Zurich (surface organometallic chemistry: Prof. Ch. Copéret / EPR spectroscopy: Prof. G. Jescke).

MrCAT project aims at developing innovative paramagnetic solid-state NMR and EPR strategies for the determination of atomic level description of highly industrially relevant Ziegler-Natta catalytic systems, which are involved in the synthesis of ubiquitous commodity polymers: polyolefins, and which present paramagnetic centers, making the use of classical spectroscopic approaches nearly impossible. This 36-month project brings together leading laboratories in magnetic resonance, polymerization and heterogeneous catalysis from France and Switzerland, and will combine methodological advances in high-resolution solid-state NMR and EPR spectroscopies with innovation in catalysis that will be applied to relevant industrial challenges in the field of polymer chemistry. The complementary expertise provided by the three joint research groups will be essential to the success of this ambitious project, which will lead to the understanding and improvement of catalytic reactions involved the polymerization of olefins (typically Ziegler-Natta catalysis). Despite its industrial relevance, this heterogeneous catalysis suffers from a lack of molecular understanding of its key features, hampering breakthrough innovation.

The PhD candidate will be in charge of synthesizing and evaluating heterogeneous Ziegler-Natta catalysts for olefin (co)polymerization. Development of cutting-edge characterization techniques such as solid-state paramagnetic NMR and EPR spectroscopies will depend on these syntheses and on the extensive know-how of C2P2 with Ziegler-Natta systems. Starting from conventional catalysts, the candidate will work her/his way towards new-generation Ziegler-Natta catalysts to access new (co)polymers from olefins and promote the design of new materials from polyolefins.

Applicants should have a master in Chemistry focusing on catalysis and/or the synthesis of polymers. Expertise in organometallic chemistry, inorganic chemistry and/or polymerizations of olefins (including catalytic polymerization) would be considered strong assets.

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