

## Research Topic for the ParisTech/CSC PhD Program

**\*Field :** Chemistry, Physical Chemistry and Chemical Engineering

**Subfield:** Chemistry, Catalysis

**Title:** Cobalt-catalyzed cross-coupling reactions

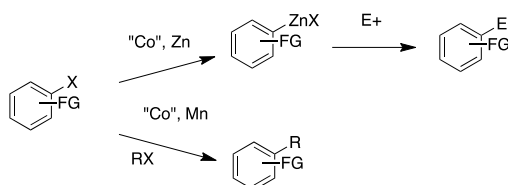
**ParisTech School:** Ecole polytechnique

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**Short description of possible research topics for a PhD:** (Over the past 40 years, the development of transition metal-catalyzed cross-coupling reactions has revolutionized techniques for the formation of carbon-carbon bonds. The cross-coupling reaction class is among the most important in organic synthesis. The development of efficient new carbon-carbon bond forming reactions by metal-catalyzed cross-coupling is still progressing impressively and significant advances have been achieved. Among the different catalysts, the most commonly employed and reliable metals are palladium and nickel. However both these catalysts systems have disadvantages (cost or toxicity). Fortunately, inexpensive alternative catalysts are available such as iron and cobalt. In our laboratory, we have developed cobalt-catalyzed cross-coupling reactions involving organozinc species with various electrophiles and cobalt-catalyzed reductive cross-coupling in order to form C-C bonds.



The proposed PhD project aims to form C-C bonds either by cobalt-catalyzed cross-coupling of different functionalized organozinc species with different electrophiles or by reductive cross-coupling.

The PhD student will therefore have to study different cross-coupling reactions. GC analysis would be used to follow the catalytic trials, and products obtained will be characterized by multinuclear NMR spectroscopy.

**Required background of the student:** organic chemistry and/or catalysis

**A list of representative publications of the group:**

-Y Cai, X. Qian, A. Rérat, A. Auffrant, C. Gosmini\* *Adv. Synth. Catal.*, **2015**, 357, 3419-3423 (VIP)

-X. Qian, Z. Yu, A. Auffrant and C. Gosmini\* *Chem Eur. J.*, **2013**, 19, 6225-6229 (Highlighted in Synfacts)

-C. Gosmini\*, J.- M. Begouin, A. Moncomble, *Chem. Commun.*, **2008**, 3221-3233.

-H. Fillon, C. Gosmini\*, J. Périchon *J. Am. Chem. Soc.*, **2003**, 125, 3867-3870