Master 2 Internship 2026

Synthesis of substituted-dicyanoaryls *via* Catellani reaction

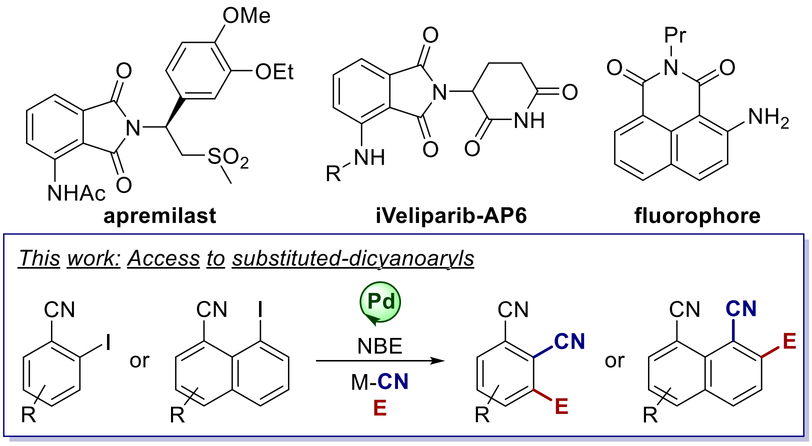
Supervisor: Dr Sébastien Prévost, *sebastien.prevost@ensta.fr*
Laboratory of Organic Synthesis (LSO) – UMR 7652
CNRS/Ecole Polytechnique/ENSTA
https://sebastienprevost1.wixsite.com/chemistrygroup

keywords: C-H activation, Catellani reaction, isoindole-1,3-dione, naphthalimide

Subject:

Isoindole-1,3-diones and naphthalimides represent privileged aromatic scaffolds displaying a broad spectrum of biological and physical properties. For example, apremilast, marketed by Amgen, is a phosphodiesterase 4 (PDE4) inhibitor used as an anti-inflammatory drug, while Veliparib-AP6 has recently been reported as a PROTAC molecule capable of degrading poly(ADP-ribose) polymerase 2 (PARP2).[1] In parallel, naphthalimide derivatives are widely recognized for their potent anticancer activity, as well as for their applications as fluorescent probes in cell imaging.[2]

These two scaffolds can be efficiently derived from the corresponding dicyano precursors. In this project, we aim to develop a streamlined synthetic approach based on the Catellani reaction,[3] to access such compounds. Starting from readily available iodo-cyanoaryls, this methodology will allow the introduction of a wide range of electrophiles at the *ortho* position, while simultaneously replacing the iodine atom with a cyano group (scheme 1). In this way, dicyanoaryls can be obtained in a single step, offering versatile intermediates whose electronic properties can be readily tuned.



Scheme 1. Synthesis of dicyano derivatives via Catellani reaction

The applicant must hold a strong background in organic chemistry and demonstrate excellent practical skills in the laboratory. In addition, solid knowledge of analytical chemistry techniques is required.

References:

[1] B. Wang, Y. Lu, C. Chen, Beilstein *J. Org. Chem.* **2025**, *21*, 407.
[2] S. Banerjee, E. B. Veale, C. M. Phelan, S. A. Murphy, G. M. Tocci, L. J. Gillespie, D. O. Frimannsson, J. M. Kelly, T. Gunnlaugsson, *Chem. Soc. Rev.* **2013**, *42*, 1601.
[3] J. Wang, G. Dong, *Chem. Rev.* **2019**, *119*, 7478.