

ECOLE DOCTORALE DES SCIENCES CHIMIQUES - ED 040

Proposition de sujets de thèse pour la rentrée 2024 / 2025

<u>Titre de la thèse</u>	Continuous flow synthesis of silicon particles guided by machine learning
Descriptif du sujet (10 lignes maximum)	<p>This project has the ambition to create high performance optically resonant silicon particles, incorporated into hydrogels, by using self-driving platforms and machine learning to discover optimized particle syntheses. The objectives of the project can be subdivided into three goals:</p> <ul style="list-style-type: none"> • Goal 1: Create time-efficient optimization of nanoparticle syntheses. An automated synthesis will produce large data sets over a large parameter space, characterized by comparing experimental spectra to an idealized spectrum, generated by simulation. • Goal 2: Resolve spectral overlap that currently limits the identification of ideal conditions. By combining multiple characterization techniques in situ (e.g. Raman, UV-Vis and DLS spectroscopies), it would be possible to target the source of peak overlap, be it polydispersity in size, in chemical composition or particle shape. • Goal 3: Use of silicon particles to create multicolored hydrogels. Colloidal inks can demonstrate stable and vivid colors. By using oppositely charged particles, e.g. silicon particles functionalized with polyelectrolytes, hydrogels can be prepared. <p>The student will work within an international French-Canadian team, and thus must have a good level of communication skills and a strong level of curiosity.</p>
Compétences souhaitées (nom du DEA, ou MASTER, etc...)	M2 Option Matériaux Avancés ou PCCP
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