



2025

Master thesis proposal – up to 5 months

Hosting laboratory:

**IPCMS <https://www.ipcms.fr/> - ICube <https://icube.unistra.fr/>
23 rue du Loess BP 20 CR - 67037 Strasbourg Cedex 2 - France**

**Characterization of Silicon clathrate devices for
optoelectronic and photovoltaic applications**

Silicon clathrates are an exotic form of silicon based on Si cages, as fullerenes in organic chemistry. Some types of these clathrates can be interesting for optoelectronic applications because they provide a direct bandgap as opposed to conventional silicon. Silicon is the second most abundant element in the Earth's crust. So far, there are only three groups in the world that produce silicon clathrate thin films, that are of interest for applications: Colorado School of Mines (USA), Gifu University (Japan) and our laboratories, ICube-IPCMS.

The purpose of the internship will be to prepare silicon clathrate films and to perform device characterizations such as heterojunctions for optoelectronic and photovoltaic applications. The potential for applications to solar cells will be assessed.

Training on techniques such as clathrate film fabrication, electron microscopy and analysis, Raman spectroscopy, Kelvin probe, and PV measurements such as I-V under solar simulator, spectral response and Surface Photovoltage will be provided.

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