Ph.D. in bio-inorganic chemistry in Grenoble

Lanthanide-based probes for luminescence and MRI detection of Zn$^{2+}$

Zinc plays an essential role in living systems, being for instance a co-factor for ca. 10% of the human proteins. Additionally, zinc is involved in numerous signaling pathways. Its concentration at the level of the organism as well as in various cellular organelles is finely regulated. Misregulation of zinc homeostasis has been associated to severe diseases (cancers, neurodegenerative diseases). Therefore, understanding the distribution of zinc at the level of the body or in cells is a topic of growing interest, which requires the development of smart molecular imaging agents able to detect Zn$^{2+}$ ions in living systems.

At the Laboratory of Chemistry and Biology of Metals in Grenoble, we are developing probes to detect Zn$^{2+}$ by luminescence or by magnetic resonance imaging. These probes are based on a zinc finger peptides serving as a Zn$^{2+}$ recognition unit. These peptides are functionalized by a suitable lanthanide(III) (Ln$^{3+}$) complex acting as a signaling unit. Several Ln$^{3+}$ cations such as Tb$^{3+}$, Eu$^{3+}$, Sm$^{3+}$ have desirable luminescence properties for bioimaging applications and Gd$^{3+}$ complex can be used as contrast agent for Magnetic Resonance Imaging (MRI) because of their magnetic properties. We have established the proof-of-principle of Zn$^{2+}$ detection in vitro by lanthanide- and peptide-based probes and shown that the zinc finger scaffold allows the design of both luminescence and MRI Zn$^{2+}$-responsive probes, depending on the Ln$^{3+}$ used. The next step is to develop new probes that can operate in living systems for confocal microscopy imaging of cells in the case of luminescence or in mice in the case of MRI.

We are looking for a Ph.D. candidate interested in bio-related chemistry that will be in charge of the synthesis of the probes, the in vitro characterization of their luminescence/MRI properties as well as their evaluation in living cells by confocal microscopy or in mice in vivo by MRI.

Should you be interested, please send a CV and a motivation letter before April the 4th, 2018.

Required skills:
Organic or peptide synthesis, knowledge in coordination chemistry and spectroscopy (fluorescence, NMR)

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http://big.cea.fr/drdf/big/Pages/CBM/PMB/Metallomeptides.aspx