

# Oferta tema de investigación para la convocatoria de contratos predoctorales para la formación de profesores universitarios FPU 2020

## Información General

Área de investigación	Química
Instituto	Instituto de Química Avanzada de Cataluña
Grupo de investigación	Química Supramolecular
Tema de investigación del grupo	Reconocimiento de biomoléculas y catálisis supramolecular
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## Detalles Sobre la Oferta

Referencia proyecto	RTI2018-096182-B-I00
Título del proyecto	Pseudopeptidic cages for the modulation of protein activity
Área global CSIC (VIDA, SOCIEDAD, MATERIA)	MATERIA y VIDA
Palabras clave	protein recognition, tyrosine kinases, cancer, supramolecular chemistry

### Resumen del proyecto (100-3000 palabras)

Tyrosine kinases (TK) are an important class of enzymes that are involved in the signaling of different cellular processes through the phosphorylation of Tyrosine (Tyr) residues. This posttranslational modification regulates the activity of the protein in which the Tyr is contained. A failure or dysregulation of these signaling networks is involved in several serious diseases. TK are particularly important because they are becoming a relevant target for their implications on different types of cancer. Thus, modulation of their activity is an important goal for biomedical research, being the corresponding synthetic TK inhibitors in continuous development for the treatment of cancer and inflammation processes. Most of the TK inhibitors bind the catalytic site or the ATP binding pocket, which are highly conserved in human TK. This enzyme promiscuity complicates the development of selective drugs, since kinases are involved in a plethora of cellular processes and the total inhibition of these enzymes can cause several undesired side effects.

In this context, in the last years we have been investigating several pseudopeptidic cages that protect tyrosine residues from the TK-promoted phosphorylation. Alternatively to conventional TK inhibitors, these cages act as a supramolecular protecting barrier to the activity of the enzyme as they are able to recognize Tyr residues with a great selectivity, competing with the enzyme. Therefore, we can suppress the phosphorylation on different model peptides without affecting the enzyme activity.

The goal of this research proposal is to deepen in the study of these intriguing molecules in different phosphorylation cascades. The candidate will prepare and characterize these compounds and study their affinity towards different amino acids, peptides and proteins using state-of-the-art experimental techniques (UV, fluorescence and NMR spectroscopy; mass spectrometry, ITC, SPR, etc.). In addition, biological studies of enzyme activity in vitro within isolated peptides and proteins or studies within cells will be carried out, either in our institute or assisted by our international collaborators.

Thus, the candidate will learn a vast amount of techniques ranging from synthetic organic chemistry and physical chemistry to biochemistry and cell culture. It is an excellent opportunity for those interested in organic and supramolecular chemistry with a biological application.