CIC biomaGUNE: CIF: G-20788840· Parque Tecnológico de San Sebastián · Pº Miramón 182· 20014 San Sebastián (Gipuzkoa)· Tel.: + 34 943 00 53 00· Fax: + 34 943 00 53 01· info@cicbiomagune.es ·www.cicbiomagune.es

CIC biomaGUNE
CENTER FOR COOPERATIVE RESEARCH IN BIOMATERIALS

seminar

Friday, 15th February, 12.00 pm, Seminar Room

Host: Prof. Luis M. Liz-Marzán

Environment-Responsive Polymers as Versatile Platform for Nanomedicine

Prof. Dr. Marcelo Calderón
Ikerbasque Research Professor
Responsive Polymer Therapeutics Group
Polymat, Basque Center for Macromolecular Design and Engineering
Paseo Manuel de Lardizabal 3, 20018
Donostia-San Sebastian, Spain

Development of effective polymer-based nanocarriers which are able to target diseased tissues still remains as a great challenge in current research. Dendritic polyglycerols (dPGs) have emerged as novel polymeric scaffolds that have demonstrated a great potential for diverse biomedical applications. These architectures have already proved their usefulness in therapeutic approaches related to multivalency, given by the synergy between the nanosized dimensions combined with the high density of functional groups. However, a continuous effort is necessary to modify and tailor polyglycerol architectures to fit the future demands of biomedical applications. The present work deals with the development of synthetic strategies that allow the linkage of dPGs to drugs, fluorescent dyes, and responsive polymers.

We have developed synthetic procedures that allow to use dPG as a multifunctional anchoring point for (1) the coupling of doxorubicin, methotrexate, and paclitaxel prodrugs through pH- or enzyme-sensitive linkers, and (2) the synthesis of environmentally responsive nanogels (NGs). As example, we have coupled to dPG fluorescence smart probes that are able to screen the intracellular environments and provide a signal that can be used as diagnostic and therapeutic tool. Moreover, we have prepared several thermoresponsive NGs as drug delivery systems based on dPG as a macro-crosslinker and different thermoresponsive polymers. Their synthesis, characterization, and potential application for topical drug delivery will be discussed. The biocompatibility of dPGs and their derivatives, together with the possibility of fine tuning their size and responsive modality, makes them ideal candidates for various therapeutic and diagnostic approaches.