

Department: Chemistry

Colloid Science and Drug Delivery

Colloid Science and Drug Delivery Group

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Objectives

Development of **controlled drug release systems** for biomedical applications:

- Development of micro and nanoparticles using smart materials that allow to **control the drug release rate** in different conditions such as as temperature and pH.
- Development of micro and **nanoparticles for target delivery** in a specific tissue/organ through particles functionalization with ligands

Methodology

Particles Engineering: Production and characterization of polymeric micro and nanoparticles using the solvent evaporation method and an emulsion-membrane technique. Study of production parameters: emulsifying agent/concentration, solvent type/volume, agitation speed, membrane properties.

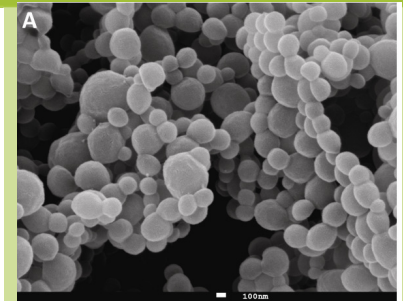
Mathematical drug release models: In vitro drug release studies and development of mathematical models describing drug release according to diffusion, swelling and erosion mechanisms.

Functionalization of nanoparticles: attachment of recognizing units to target a specific tissue/organ. Model unit: anti-CD8

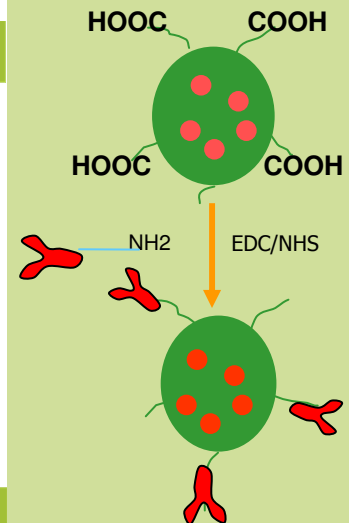
In vitro cell assays: functionalized nanoparticles targeting efficiency are tested using different cell lines. Model line: HEK cells expressing CD8 (CD8+) and not expressing CD8 (CD8-).

Expected Results

- Produce nanoparticles with the desired properties: size, zeta potential, degradation behaviour that allow to get the desired drug release rate.
- Develop mathematical models that allow to predict the drug release rate as a function of particles properties and release conditions
- Develop multifunctional nanoparticles with a unit attached able to recognize specific cells, be attached to and be internalized by these target cells.



Targeting unit: anti-CD8 that recognizes a leukemia receptor



In vitro cell assays:

HEK CD8+ cells



Anti-CD8 nanoparticles

