

Chemistry Department

PURE-type dendrimers synthesis in $scCO_2$

Group of Polymer Synthesis and Processing (GPS&P)
<http://docentes.fct.unl.pt/air>, www.dq.fct.unl.pt/scf



Rita B. Restani

PhD Student
Sustainable Chemistry FCT/UNL

Advisors:
Prof. Ana Aguiar-Ricardo
Dr. Vasco D.B. Bonifácio

MSc in Biotechnology, FCT/UNL
Degree in Technological Chemistry, FCUL



Objectives

Synthesis and characterization of polyurea (PURE) dendrimers¹, a new family of water-soluble blue photoluminescent, biocompatible and biodegradable bifunctional dendrimers. These templates will be grafted with different polymers and bioactive molecules in order to improve their nano-scale scaffolding and nano-container properties with a precise size and shape. The synthesized dendrimers will be fully characterized and their potential as drug delivery carrier explored.

Methodology

The experimental work will be developed in four major interconnected phases:

- (i) synthesis of a versatile library of highly functional, biodegradable and biocompatible dendrimers with controlled size and morphology;
- (ii) detailed characterization of the dendrimers library;
- (iii) *in vitro* studies for biocompatibility and cellular up-take evaluation;
- (iv) drug delivery studies;

Our synthesis methodology is based on a sustainable strategy, which takes advantage of CO_2 as solvent, in the supercritical state, and as a reagent.

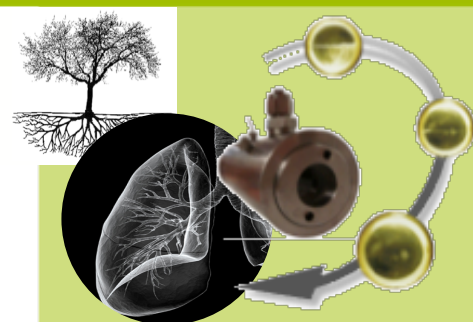
Expected Results

Fluorescent PURE-type dendrimers are expected to be used in diagnosis and therapy as such they should:

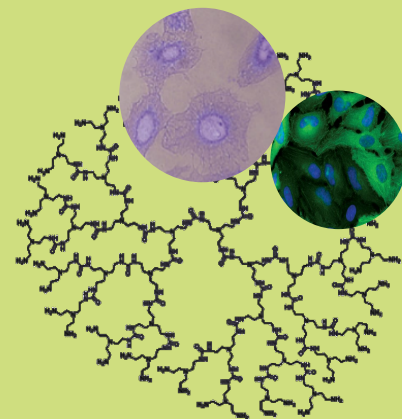
- have highly controlled geometry, surface charge and physicochemical properties;
- be water soluble, biocompatible and biodegradable;
- be able to achieve active targeting;
- deliver bioactive molecules;
- be able to be internalized by cells and to deliver the bioactive molecules to their nucleus.

Funding: Fundação para a Ciência e a Tecnologia FC&T through the grant SFDH/BD/66858/2009 and through the projects PTDC/CTM/099452/2008, PTDC/EQU-EQU/116097/2009, Luso-German Bilateral Agreement 2010 and PEst-C/EQB/LA0006/2011.

1. Rita B. Restani *et al.*; *Angew. Chem. Int. Ed.* **2012**, 51, 5162.



Supercritical Technology



PURE-type G4

