SCIENCESPRINGDAY

FCT FACULDADE DE CIÊNCIAS E TECNOLOGIA UNIVERSIDADE NOVA DE LISBOA

Chemistry Department

Smart Polymers / Mobile-learning

REQUIMTE
Group of Polymer Synthesis and Processing
Applied Organic Chemistry

vbb@fct.unl.pt
www.bonifacio.ws

Vasco DB Bonifácio

Principal Investigator

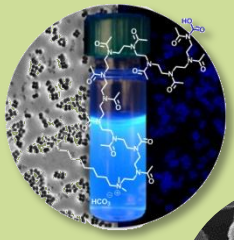
PhD in Chemistry
Organic Chemistry
FCT/UNL 2006

Visiting Researcher
Koch Institute for Cancer Research
MIT 2012

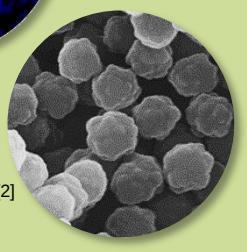
Objectives

Design of complex polymer architectures tailored for applications in **drug/gene delivery**,[1,2] **chemical-**[3] and **biosensing**,[4] and **molecular electronics**.[5] Application of **green methodologies** to organic synthesis.[6] Development of **mobile-learning**[7] and **cheminformatic tools**[8] for teaching chemistry to blind and visually impaired students.

[1] VDB Bonifácio* et al. *Angew. Chem. Int. Ed.* **2012**, *51*, 5162. [2] VDB Bonifácio* et al. *J. Supercrit. Fluid.* **2010**, *55*, 333. [3] VDB Bonifácio* et al. *J. Polym. Sci. Part A: Polym. Chem.* **2008**, *46*, 2878. [4] VDB Bonifácio* et al. *Mat. Lett.* **2012**, *81*, 205. [5] VDB Bonifácio* et al. *Biosen. Bioelectron.* **2010**, *26*, 1662. [6] VDB Bonifácio* et al. *Chem. Soc. Rev.* **2013**, in press. [7] VDB Bonifácio* *J. Chem. Educ.* **2012**, *89*, 552. [8] RPS Fartaria et al. *Eur. J. Org. Chem.* **2013**, 1415.



Fluorescent biotags[4]



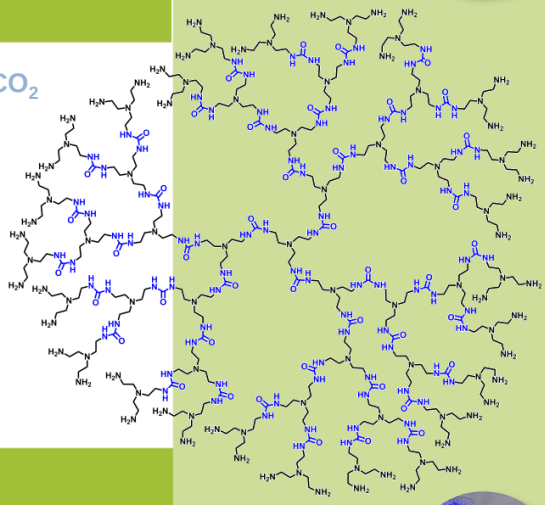
Polen-like mesoporous microparticles[2]

Methodology

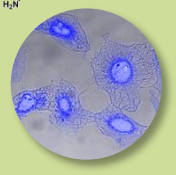
The polymer synthesis is performed in a high-pressure cell using supercritical carbon dioxide. CO_2 is used as a solvent and a reagent (C1-feedstock), being incorporated in the polymers backbone.

After the polymerization the polymers are purified by washing with fresh CO_2 (solid particles) or dialysis (water-soluble polymers).

High-pressure cell



Dendrimer therapeutics[1]



LOC device for detection of chemical weapons[5]

Audio QR-coded Periodic Table[7]

Expected Results

- Tailored biocompatible and biodegradable polymeric nanomaterials by using supercritical carbon dioxide as an economic and clean technology.
- Development of biomimetic nanocarriers and lab-on-a-chip (LOC) devices for diverse applications (*e.g.* Nanomedicine, Molecular Electronics).
- Novel strategies (simple, cheap, benign) towards more sustainable industrial processes.
- Novel tools to teach chemistry to blind and visually impaired students.

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