

CHEMISTRY DEPARTMENT

From CO₂ to New Materials

REQUIMTE/ SUPERCRITICAL FLUIDS



Ana V.M. Nunes

Post-Doc Researcher

2011 – Post-Doc at FCT
2009/2010 – Researcher at IBET
2008 – PhD in Chemical Engineering (FCT/UNL) - “Phase behaviour control of supercritical CO₂ separation and reaction processes”

Objectives

Development of an **integrated process** to produce **new polycarbonates (PC)** totally derived from **renewable resources**, by combining carbon dioxide (CO₂) with natural occurring building blocks.

CO₂ is used alternatively to traditional fossil fuels, as an available, cheap, non-toxic and renewable carbon resource with formation of compounds containing the entire COO moiety, therefore **promoting sustainability**.

Natural substrates as limonene, pinene, myrcene and triglycerides are being explored.

Methodology

O₂-oxidation reaction of the olefin in high pressure CO₂ media, is followed by an alternating **copolymerization** of the resulting epoxide with CO₂, that act both as solvent and as reactant during the process.



An efficient catalyst system for both oxidation and polymerization reactions is being developed in a collaboration between FCT and IST.

Expected Results

Main expected result is to achieve **control of the polymer molecular weight and final physical-chemical properties** by varying operating conditions.

New polycarbonates entirely made from renewable resources will be produced to substitute petrochemical-based plastics, mainly for drug delivery and biomedical applications, an expected area of growth. (e.g. membrane cartridge for renal dialysis, blood oxygenators, blood reservoirs, blood filters and also replacing metal in surgical instruments).

