



Πανεπιστήμιο Κύπρου
Τμήμα Χημείας

Το Τμήμα Χημείας του Πανεπιστημίου Κύπρου
σας προσκαλεί στην παρουσίαση της Διδακτορικής Διατριβής

του κ. Μάριου Ελλαδίου

την Τετάρτη, 22 Μαρτίου 2017, (ώρα 09:30, Αίθουσα Β127)

με τίτλο:

**“Degradable Polymers Containing Labile Pyridinylalkyl Ester Groups
in the Monomer Unit, Cross-linker, Initiator or Inimer”**

(Ερευνητικός Σύμβουλος: Καθηγητής Κώστας Πατρίκιος)

Περίληψη

This PhD Thesis is concerned with the design, synthesis, polymerization, and stability of a series of nine pyridinylalkyl methacrylate monomers and related monomers, as well as three compounds based on 2,6-pyridinediethanol diesters: a degradable cross-linker, a degradable bifunctional initiator and a degradable inimer. The pyridinylalkyl methacrylates were homologues differing in the position of the nitrogen atom in the pyridine ring (2-, 3- or 4-pyridine) or/and in the length of the spacer (from methyl to propyl) between the ester moiety and the pyridine ring. The thermal and hydrolytic stability under alkaline and acidic hydrolysis conditions of the pyridinylalkyl methacrylate homologous polymers was investigated. All polymer homologues were stable under acidic hydrolysis conditions, but presented partial or complete lability to alkaline hydrolysis conditions or thermally, as manifested by the cleavage of the pyridinylalkyl side-group. The three isomeric polymer homologues bearing an ethyl spacer were fully cleaved under alkaline hydrolysis conditions yielding poly(methacrylic acid) (pMAA) and the corresponding vinylpyridine, while the other six poly(pyridinylalkyl methacrylate) homologues were partially cleaved to pMAA and the corresponding hydroxyalkylpyridine. Furthermore, the two isomeric polymer homologues bearing an ethyl spacer with the nitrogen placed at position 2 or 4 in the pyridine ring were also cleaved at around 200 °C yielding pMAA and the corresponding vinylpyridine, while the other isomeric polymer ethyl homologue with the nitrogen placed at position 3 was thermally more stable, presenting only partial cleavage to pMAA units and 3-vinylpyridine. The other six polymer homologues were thermally more stable than the three above-mentioned isomeric polymer ethyl homologues. Additionally, some related polymers were also synthesized, whose chemical structure was similar to that of poly(2-(pyridin-2-yl)ethyl methacrylate) (p2PyEMA), but having a non-ester side-group by replacing the ester linkage for amide or thioester, or a non-pyridine aromatic group by replacing the pyridine ring for a benzene ring, or a substituted ethyl ester spacer, by introducing one or two methyl groups on the carbon at 2-position in the ethyl spacer. These related polymers were more stable than p2PyEMA both toward thermolysis and alkaline hydrolysis conditions, with the polyamide homologue being extremely stable. Subsequently, by preparing and studying the copolymers of 2PyEMA with tetrahydro-2H-pyran-2-yl methacrylate (THPMA), a well-known acid labile monomer, it was proven that the 2PyEMA and THPMA units are orthogonally deprotectable. Finally, polymers bearing the cross-linker, inimer, or bifunctional initiator based on 2,6-pyridinediethanol were shown to cleave under thermolysis or alkaline hydrolysis conditions at the sensitive diester moieties of the diol, converting hyperbranched polymers, linear polymers and end-linked polymer networks to linear polymers, linear polymers with half the initial molecular weight, and star polymers, respectively. All the above, newly-developed monomers, cross-linker, inimer, and bifunctional initiator form a new platform of molecules which are expected to be useful for macromolecular engineering, so as to provide novel carboxylic acid group protection, or, conversely, more stable monomer repeating units, or, finally, novel cleavable branching points.

Για περισσότερες πληροφορίες παρακαλώ επικοινωνείτε:

Τμήμα Χημείας, τηλέφωνο: 22892780

<http://www.ucy.ac.cy/~chemweb/greek/index.html>