

Functionalization of biointerfaces - Design and monitoring of ECM analogous biointerfaces for biomedical and biophysical applications

2 Synthesis and evaluation of photochemically polymerizable biomaterials for manufacturing of ECM analogous matrices by laser structuring



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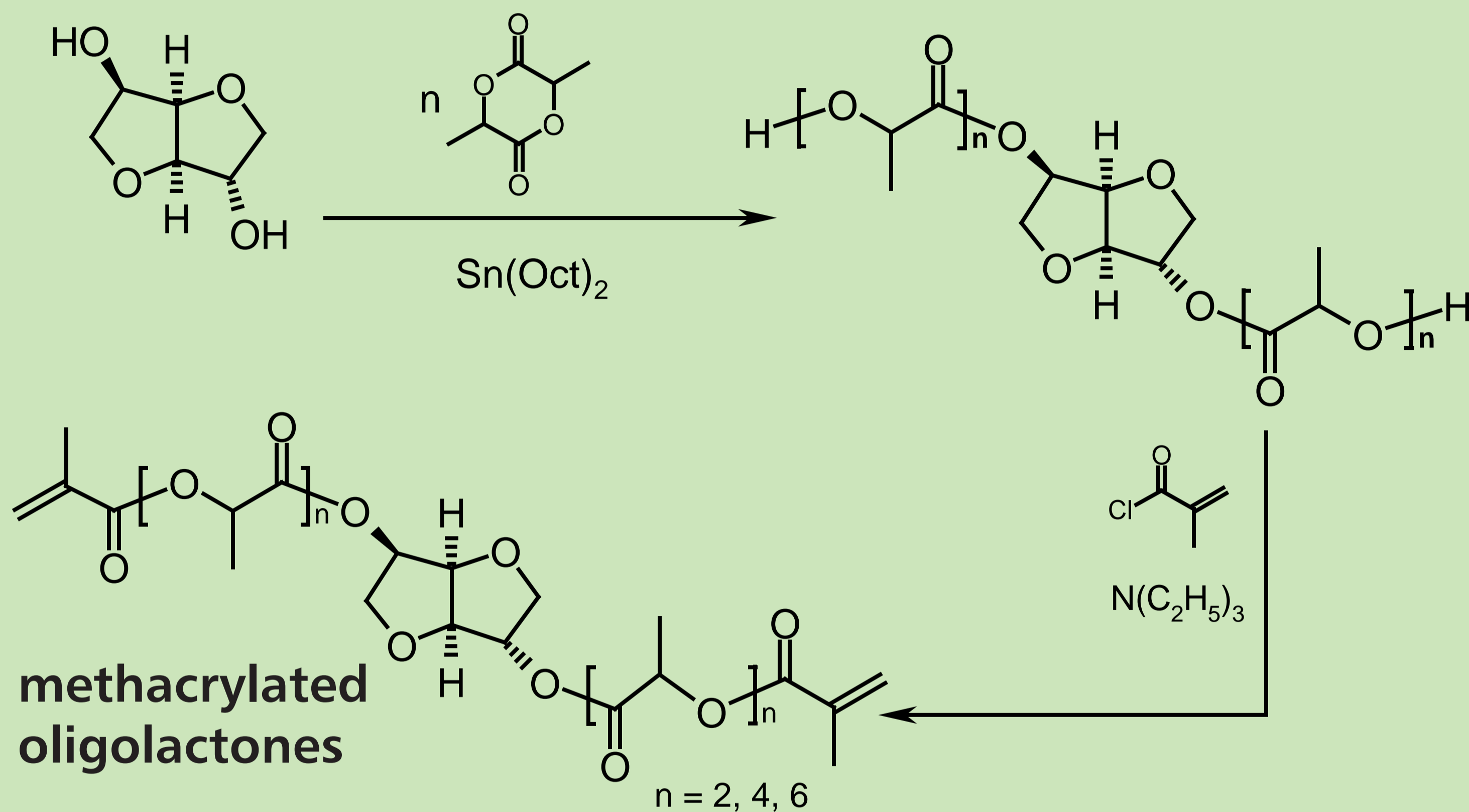
A main field of research in the department of biomaterials at INNOVENT e.V. is the synthesis and modification of biopolymers to provide suitable materials fulfilling specific requirements of biological systems since novel technologies and therapies require specially tailored materials.

In the sophisticated project to develop ECM analogous three-dimensional biointerfaces as implant coatings and tissue engineering matrices by laser structuring, suitable functional materials are required. In our group we

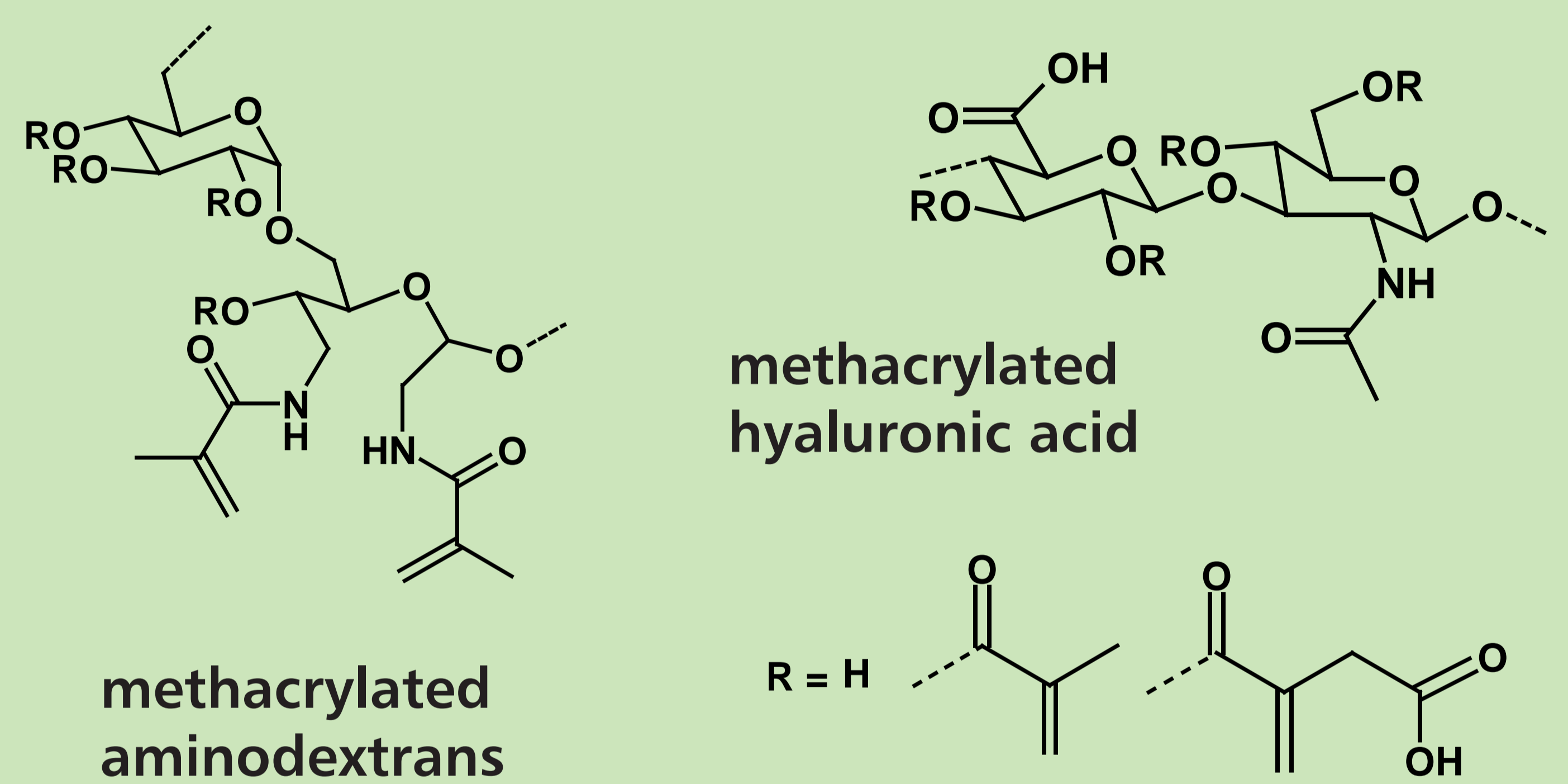
focus on synthesis of cross-linkable (meth)acrylated derivatives of dextrans, hyaluronic acids, oligolactones and other biologically relevant molecules enabling two photon polymerization. The aim is the formation of micro- and nanostructured hydrogels possessing desired properties in view of mechanic stability, degradation and biocompatibility. In this context our research comprises the following investigations:

SYNTHESIS OF CROSS-LINKABLE BIOPOLYMERES

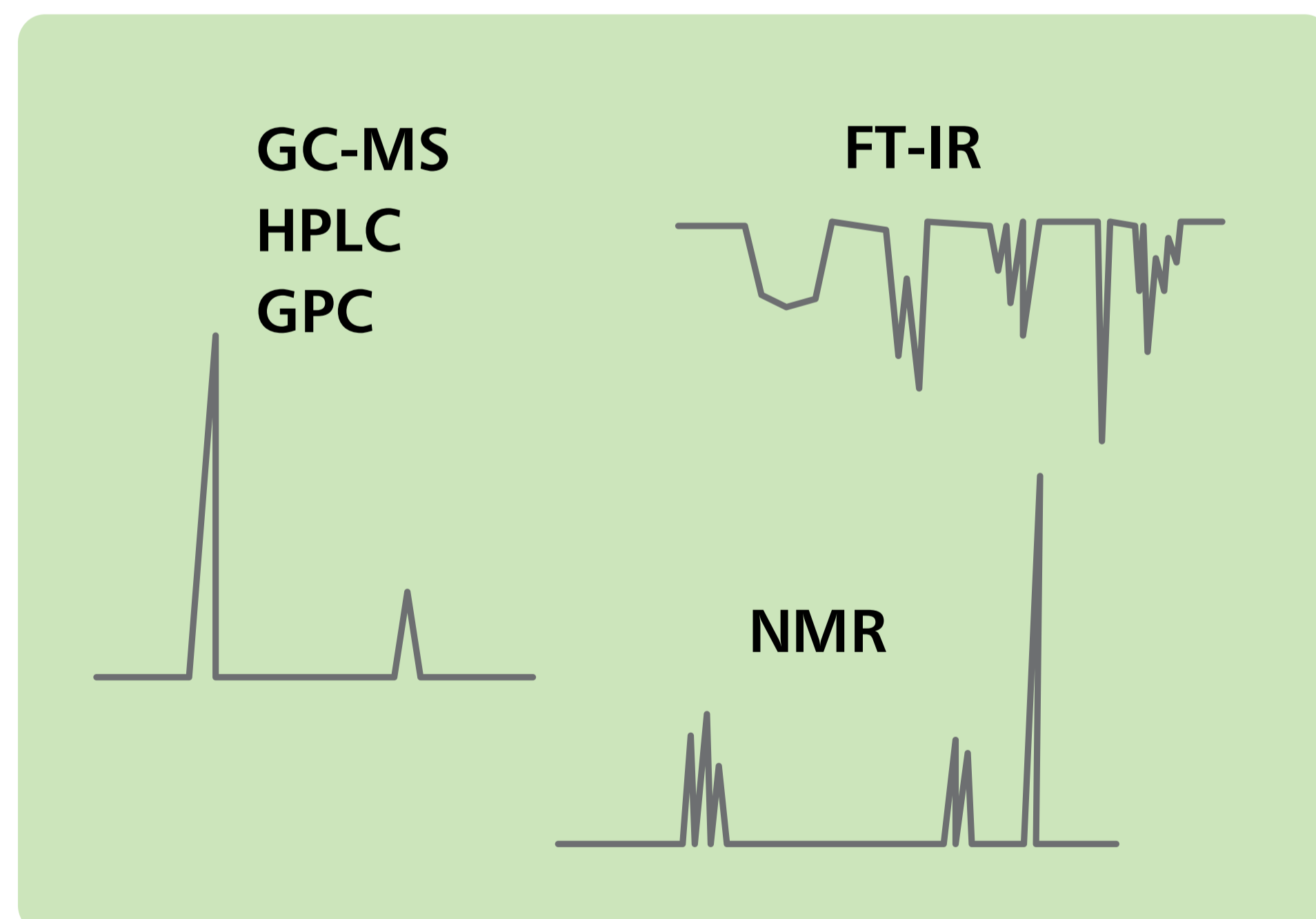
Oligolactide synthesis



Synthesized polysaccharides

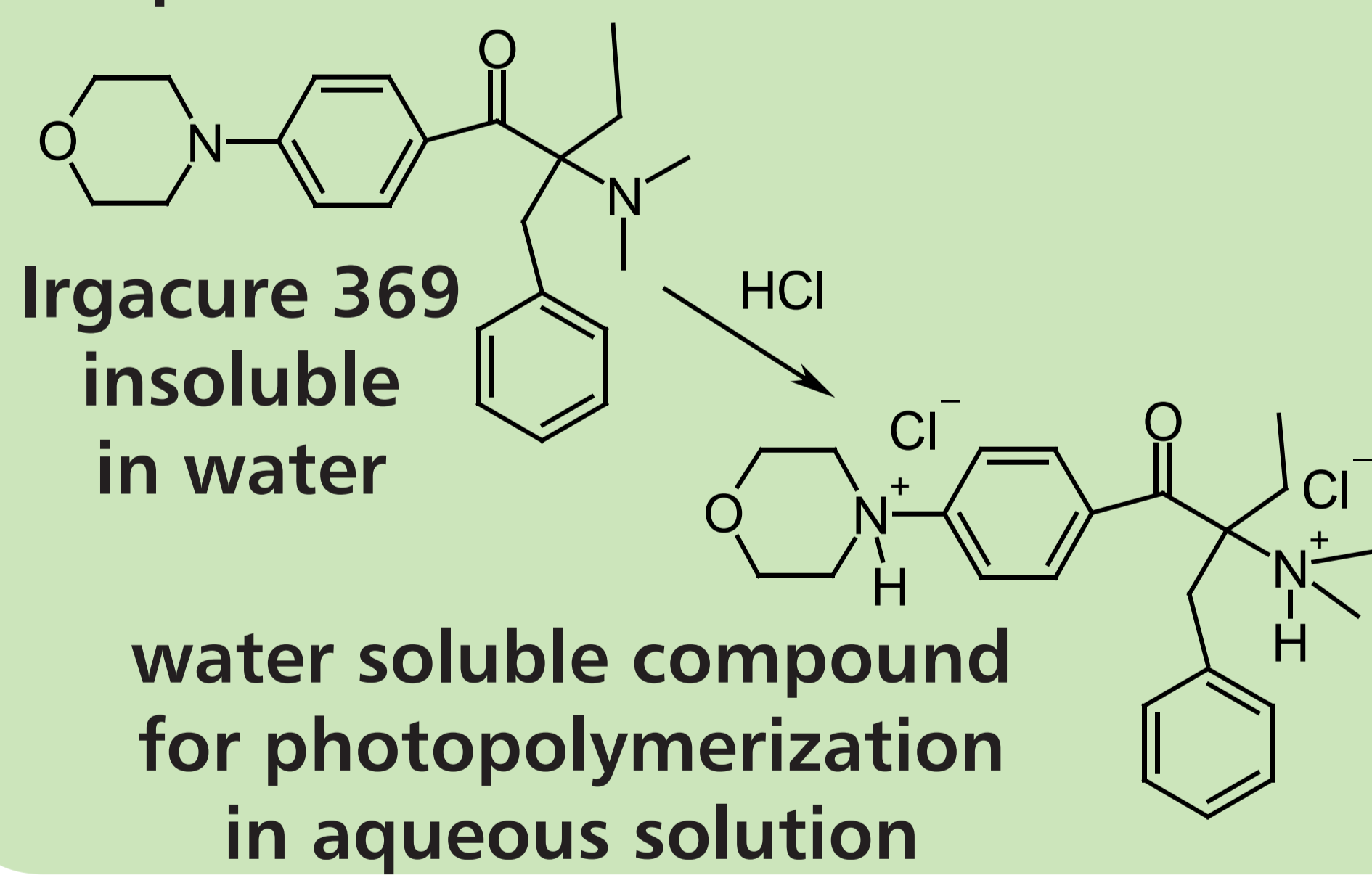


ANALYTICS

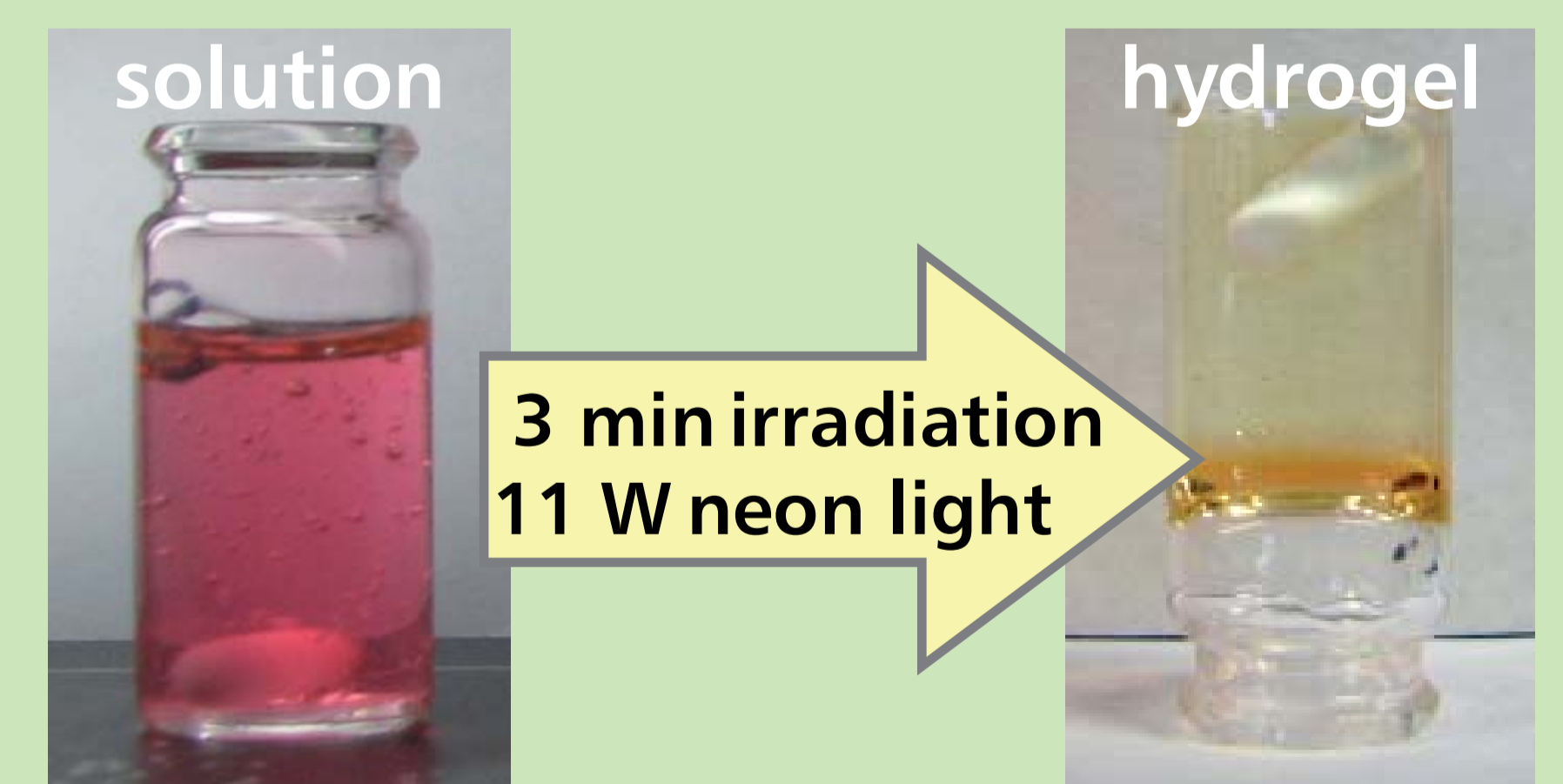


SYNTHESIS, SELECTION AND TESTING OF SUITABLE PHOTOINITIATORS

Preparation of water soluble initiators



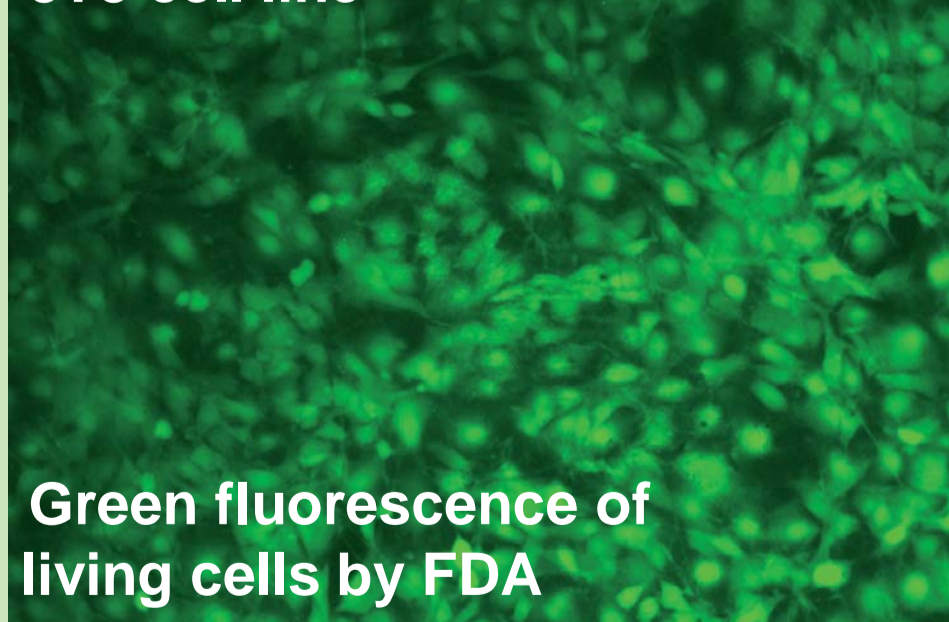
Photopolymerization of methacrylated hyaluronic acid



INVESTIGATION OF CYTOTOXICITY

Photopolymerized hydrogels of hyaluronic acid show less cytotoxicity in the live/dead assay with FDA/EtBr

3T3 cell line



Green fluorescence of living cells by FDA



Red fluorescence of dead cells by EtBr

A number of fully characterized methacrylated compounds could be prepared enabling two photon polymerization.

Using selected photoinitiators photocrosslinked hydrogels were generated showing good mechanical stability in aqueous solution. The biological investigations substantiated the absence of cytotoxic effects of the hydrogels emphasizing its applicability for ECM analogous three-dimensional biointerfaces.

RESULTS



2-photon polymerization at iba (Dr. Th. Weiss)

INTERNET

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