UNIVERSITEIT GENT

CHEMTECH LIFE SCIENCE

TECHNOLOGY OFFER

CELL-INTERACTIVE POLYESTERS INTENDED FOR MEDICAL APPLICATIONS

We are seeking partners interested to explore our cell-interactive PET-like polymers with a unique set of properties.

INTRODUCTION

Poly(ethylene terephthalate), PET and expanded poly(tetrafluoroethylene) (ePTFE) propelled as vascular graft materials due to their excellent bulk properties (e.g. good mechanical and thermal properties), easiness in processability and good durability. Recently, polyurethane-based materials were introduced within the cardiovascular market due to their enhanced flexability when compared with PET and ePTFE. Some disadvantages of the mentioned vascular graft materials include durability issues (e.g. in case of the PU derivatives), flexibility issues resulting into compliance mismatch (the implant present enhanced rigidity when compared with the native vessel, often leading to hypertension issues), toxicity issues because of coating reagents (e.g. formaldehyde). Nevertheless, the major disadvantage of nowadays applied materials is the limited cell-interactive properties they present, which results into a poor integration of the implant within the human body.

TECHNOLOGY

Researchers at Ghent University from the research group of Prof. P. Dubruel have engineered **PET-like materials** with unique surface and bulk properties in order to overcome the current limitations. Thus, polyesters were developed that are water insoluble, chemically inert and thermally stable up to 300 degrees (under both inert and oxidative conditions). A flexibility increase up to 6.5 fold compared with pristine PET was obtained. Moreover, non-cytoxicity, enhanced bio- and haemocompatibility of these polyesters was proven by standard ISO cytotoxicity tests, *in vitro* cell testing and clotting tests, respectively.

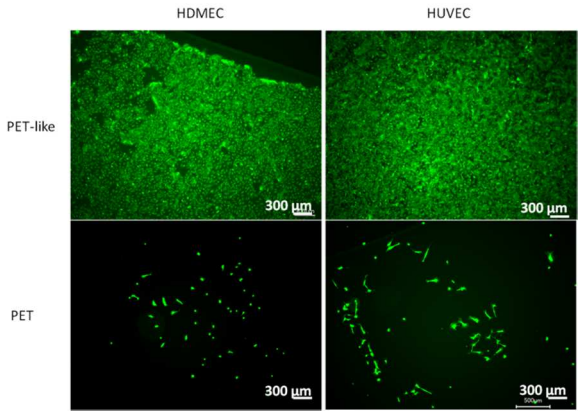

Figure 1. The cell-interactive properties of one of the PET-like polyesters compared with PET. The primary endothelial cell (e.g. HDMECs and HUVECs) proliferation after 1 week seeding is shown by calcein AM immunofluorescence stainning, where calcein AM is specific for alive/viable cells.

APPLICATIONS

Our versatile PET-like polyesters are intended for medical applications especially for cardiovascular applications, including **sutures, vascular grafts, by-pass grafts, patches and meshes**.

ADVANTAGES

Strikingly, the **PET-like polyesters present unique surface properties when compared with their commercially available homologues (PET or ePTFE)**, namely **cell-interactive properties towards endothelial cells**. This is a highly advantageous property as it allows surface endothelialisation which facilitates the implant integration and acceptance within

the human body and eliminates any haemocompatibility issues (the main cause of vascular graft failure). This unique property motivates **the direct use of vascular grafts** produced from such PET-like **without the need of applying an additonal coating** to ensure the biological integration of the implant.

A) ADVANTAGES RELATED TO THE SYNTHESIS METHOD:

- Straightforward one-pot synthesis in the presence of a solvent which allows an efficient up scaling of the production and high reproducibility of the polymer properties **in the absence of any catalyst**.

B) ADVANTAGES RELATED TO THE SYNTHESIZED POLYESTERS:

- Chemical inertness and poor solubility in most organic solvents, except chloroform and trifluoroacetic acid, thus allowing disinfection of the implant with medical grade alcohols.
- Good thermal and thermo-oxidative stability, allowing polymer processing under high temperatures both in air and under inert atmosphere without degradation of the polymers.
- Tuning possibilities of the mechanical properties
- High processability - the polymers can be processed into rods/ filaments *via* melt extrusion (e.g. bioplotting) or films *via* hot embossing techniques.
- Enhanced bio- and haemocompatibity as proven by cytotoxity evaluation and clotting time assays.

STATUS OF DEVELOPMENT

A homologous series of PET-like polyesters have been synthesized and fully characterized. Preliminary *in vitro* cell testing was performed including endothelial cell adhesion, proliferation and viability evaluation, together with cytotoxicity and endotoxicity testing.

PARTNERSHIP

Ghent University is seeking licensing or collaborating partners for further development of tailor made polyesters suitable for your application.

INTELLECTUAL PROPERTY

A European patent application was filed as priority application.

KEYWORDS

Vascular grafts, haemocompatibility, cell-interactive properties, PET, ePTFE

CONTACT

Dr. AN VAN DEN BULCKE
Business Developer - CHEMTECH FOR LIFE SCIENCES
GHENT UNIVERSITY – Belgium
a.vandenbulcke@ugent www.chemtech.UGent.be
T +32 9 264 44 62 **M** +32 474 812381