Jožef Stefan Institute
Ljubljana, Slovenia

TECHNOLOGY OFFER

BIOACTIVE PIEZOELECTRIC MULTILAYER

Fields of use
Surgical meshes, biosensors, patches and electrostimulation devices

Current state of technology
TRL3 - Experimental proof of concept; Early biological validation.

Next steps
Full preclinical safety and performance package; Product and manufacturing validation; Regulatory and clinical pathway execution.

Type of cooperation
Technical cooperation agreement, License agreement.

Partners sought
- Implantable medical textile and surgical mesh companies;
- Bioelectronic/ electrostimulation device companies;
- Biosensor and smart medical textile companies.

Intellectual property
Patent pending

Developed by
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Biodegradable piezoelectric polymers are attractive for implants, biosensors, and tissue engineering, but **their shear piezoelectric response is limited**. Because soft tissues and body-facing implants are exposed to deformation, improving shear piezoelectricity is important for effective sensing, stimulation, and regenerative performance. Existing multilayer designs, however, typically use inert adhesive or electrode interlayers, which hinder direct electromechanical coupling between active layers and restrict biomedical integration.

Our technology
We offer a **biodegradable multilayer piezoelectric structure made of organic piezoelectric layers** that are plasma-treated and directly bonded without adhesive interlayers. The structure is then activated by ultrasound, which induces coordinated deformation between layers and enhances shear piezoelectricity through electromechanical coupling. The technology can be implemented in implantable or non-implantable medical formats such as surgical meshes, biosensors, patches and electrostimulation devices.

Main Advantages
- **Higher functional response**: the multilayer architecture increases shear deformation and improves piezoelectric performance compared with single-layer organic piezoelectric materials.
- **No inert adhesive layer**: direct plasma bonding preserves interlayer electromechanical interaction and avoids inactive interfaces that reduce coupling efficiency.
- **Biomedical versatility**: biodegradable, soft, and adaptable to meshes, patches, sutures, coatings, and bioelectronic interfaces for regenerative and stimulation-related uses.