The Eindhoven University of Technology, Department of Mechanical Engineering has a vacancy for

**PhD student “Smart material and shunt design for post-operative flow control in a novel glaucoma implant”**

**Project**
Glucoma is the leading cause of preventable blindness, estimated to cause bilateral blindness in 11 million people by 2020. Treatment modalities include surgery to reduce intraocular pressure (IOP). State-of-the-art glaucoma filtration surgery (GFS) has been used for decades with only slight improvements and has high failure and complication rates. This PhD project is part of a bigger program in which we will combine expertise on ophthalmology, cell biology, biomedical and mechanical engineering as well as polymer chemistry to develop a novel procedure for GFS. This consists of a new, minimally invasive and smart implant.

In this PhD project, we will develop a smart solution to control the flow rate through the novel glaucoma implant, post-operatively. The most recent implant consists of a flexible polymer tube (inserted in the eye with a surgical procedure) that connects the anterior chamber (under the cornea) to the sub-conjunctival space, acting as a shunt. Due to the pressure difference between these locations, aqueous humor flows from the anterior chamber to the sub-conjunctival space thereby lowering the pressure in the eye. Once implanted, the flow rate through this microshunt cannot be controlled anymore, although clinical practice has shown that this is highly desirable for many patients to control intraocular pressure (IOP) and reach target IOP. We will combine our expertise on smart responsive materials, microfluidics design, and microfabrication, to develop a polymeric shunt that allows for post-operative, non-invasive adjustment of the hydrodynamic resistance and therefore for control of flow. This work involves materials research, microfluidic shunt design, microfabrication, and experimental testing. The final aim is to produce prototype shunts that can be used for animal testing by our project partners.

**Requirements**
We are looking for a scientist with a background in materials science, mechanical engineering, biomedical engineering, or chemical engineering, who enjoys to work in a multidisciplinary academic environment and translate his/her knowledge towards applications. The ideal candidate would have experience in both microfluidics and smart materials, but excellent candidates with a background in one area (and an interest to master the other) will also be considered. Important personal skills include a proven ability to manage projects, collaborate with external parties and be self-driven.

**Embedding**
The PhD student will be embedded in the Microsystems group headed by prof.dr.ir. Jaap den Toonder, in close collaboration with the Stimuli-responsive Functional Materials & Devices (SFD) group headed by prof.dr. Albert Schenning. Both research groups are part of the Institute of Complex Molecular Systems (ICMS). The Microsystems group manages the Microfab lab, a state-of-the-art micro fabrication facility that houses a range of micro manufacturing technologies – microfluidics technology is one of the main research pillars of the group. The project is a collaboration within a larger consortium, including Maastricht University Medical center, Innfocus, Materiomics, and Oftavinci: SEAMS (Smart, Easy and Accurate Minimally invasive Glaucoma Surgery).

**Employment conditions**
We offer you:

- An exciting job in a dynamic work environment and multidisciplinary consortium.
- A full time appointment for four years by Eindhoven University of Technology (www.tue.nl/en)
- A gross monthly salary in line with the Collective Agreement for Dutch Universities.
- The possibility to present your work at international conferences.
• A personal development program for PhD students (Information on the PROOF program can be found on: https://www.tue.nl/en/university/working-at-tue/development-and-career/scientific-personnel/phd-and-postdoc/providing-opportunities-for-phd-students-3tu/)

• An attractive package of fringe benefits, including end-of-year bonus (8.3% in December), an extra holiday allowance (8% in May), moving expenses and excellent sports facilities.

Further information can be obtained from: Prof.dr.ir. J.M.J. den Toonder, phone +31 40 247 5706 and e-mail j.m.j.d.toonder@tue.nl.

Your application can be addressed to Prof.dr.ir. J.M.J. den Toonder. Applications must include a personal motivation letter, and a Curriculum Vitae including the names and contact details of at least two references. Only complete applications will be considered. Consideration of the candidates will begin immediately, until the position is filled.