

## ESR Project Information Sheet

<b>Project title</b>	Intraocular lenses with prophylactic action against endophthalmitis
<b>Reference number</b>	ORBITAL_ESR_2019_Project 5
<b>Host Institution/University</b>	Instituto Superior Técnico
<b>Supervisor(s)</b>	A.P. Serro (Supervisor); B. Sarramago, A. Chauhan, S. Nicoli (Academic co-supervisors); S. Anguino-Igea (Non-academic supervisor)
<b>Research Group</b>	Biomaterials Research Group, IST
<b>Department / School</b>	Chemical Engineering Department, Instituto Superior Técnico
<b>Duration</b>	4 years
<b>Status: Full-time / part-time</b>	Full-time Structured PhD Programme There are 36 months of funding and the student will be expected to self fund for final year
<b>Funding information</b>	Funding agency: H2020-MSCA-ITN-2018
<b>Early Stage Researcher Allowances:</b>	Living allowance: €33,040 + + mobility allowance of €7,200 p/a + family allowance where applicable ( <b>all values before tax and social security payments</b> ) Fees: Enrolment in the IST PhD Program
<b>Closing date and time</b>	5 p.m. (CET) Friday 28 <sup>th</sup> June, 2019
<b>Commencement date</b>	2 <sup>nd</sup> September 2019

### Post summary

Cataract is the most common cause of vision loss in people over age 40 and is the principal cause of blindness in the world. Due to the increase of longevity, it is predicted that the number of people with cataract increases both in developed and developing countries. Surgical procedure at clinical conditions for treatment of cataract involves the removal of the nucleus of the opacified natural eye lens through a micro-incision and replacement by a shape memory polymer intraocular lens (IOLs). The most dramatic complication of IOLs implantation is endophthalmitis, a bacterial infection that may cause severe inflammation, corneal opacification and even eye loss. Proper administration of antibiotics and anti-inflammatories in the post-surgical period plays a crucial role in preventing complications such as infection or cystoid macular edema. Although eye drops are well accepted by patients and have a low cost, they present several drawbacks: lead to significant drug losses (> 95%), may origin side effects due to systemic absorption, present low penetration rates in the cornea and short residence time which gives rise to a high variability of the drug level in the intraocular tissues and need of frequent administration, resulting in poor patient compliance and limiting the therapeutic efficacy. More, since most people operated to cataract are elderly, the administration of eye drops is often difficult and causes anxiety. The development of drug loaded IOLs loaded with the two types of drugs is seen as a major advance in ophthalmic therapeutics, since it will allow overcoming most of the problems referred. Actually, there are no drug loaded IOLs in the market, although it is recognized an important niche related mainly to the prevention of post-surgical complications.

The main objective of this project is to develop IOLs loaded simultaneously with antibiotic and anti-inflammatories, designed to have a prophylactic action against endophthalmitis.

The main phases of the research can be summarised as follows:

- Selection of IOL compositions and of drugs suitable for the prevention of endophthalmitis
- Definition of protocols for quantification of drugs and drug loading/release tests in static and hydrodynamic conditions to simulate the eye functioning. Numerical modelling to test the effectiveness of loaded lenses.
- Characterization of the drug loaded IOLs concerning optical and physical properties, e.g. transmittance, refractive index, wettability, swelling behavior, mechanical properties. The cytotoxicity of the best systems also will be accessed.
- Evaluation of the sterilization effect on the drug release profiles and properties of the loaded IOLs

### **Standard duties and responsibilities of the ESR**

For the 36 months of employment contract the ESR will be required to work exclusively on the MSCA programme.

**In all cases, all duties and responsibilities will be clearly outlined in the researchers Personal Career Development Plan, as determined in the early stages of the project between the ESR and their supervisory committee.**

### **Person specification**

#### **Qualifications**

Essential

Applicants should hold or expect to attain, as a minimum of 7/10, or equivalent, in Chemistry subjects, Biomedical Science, Materials Science or related area.

#### **Knowledge & Experience**

Essential

- Research project carried out in one of the above disciplines
- A demonstrated knowledge of at least two of the following: pharmaceutical formulation development, drug delivery, cell culture/molecular biology, nanotechnology, polymerisation techniques, materials characterization

#### **Skills & Competencies**

Essential

- Applicants whose first language is not English must submit evidence of competency in English, preferably B2 level or equivalent.
- Evidence of interest, aptitude and research experience in the above disciplines

### **Further information**

For any informal queries, please contact Dr. Ana Paula Serro on +351 218419240 or by email on [anapaula.serro@tecnico.ulisboa.pt](mailto:anapaula.serro@tecnico.ulisboa.pt)

For queries relating to the application and admission process please contact Dr Laurence Fitzhenry at [orbital@wit.ie](mailto:orbital@wit.ie) or by telephone at +353 (0)51 302624.

Website: [www.orbital-itn.eu](http://www.orbital-itn.eu)

**The Institute may decide to interview only those applicants who appear from the information available, to be the most suitable, in terms of experience, qualifications and other requirements of the position.**



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