

## Contract 2020247

This contract is established following the decision of the JECS Trust Board of **27<sup>th</sup> February 2021**. It is entered into by and between:

**JECS Trust**, a trust incorporated under the laws of Belgium, and having its registered office at avenue Gouverneur Cornez 4, 7000 Mons, Belgium.

and

The **FunGlass - Centre for Functional and Surface Functionalized Glass** incorporated under the laws of **Slovakia**, and having its registered office at **Alexander Dubček University of Trenčín, Študentská 2, 911 50 Trenčín**.

Purpose of the Contract

The JECS Trust will provide funds in connection with a project "**Stay of Aleksandra Nowicka in MATEIS - Acid corrosion surface modification of zirconia-based dental materials for enhanced osseointegration**", defined in Annex 1 hereto (the "Project").

The JECS Trust and the **FunGlass - Centre for Functional and Surface Functionalized Glass** are hereinafter referred to as the "Trust" and the "Receiving Party", as the case may be. JECS Trust and the **FunGlass - Centre for Functional and Surface Functionalized Glass** are hereinafter collectively referred to as the "Parties".

Now, therefore, the Parties agree as follows:

### 1. Focus

The main objective in the expenditure of Trust money is the promotion of student/young researcher activities, but not exclusively so. For all such activities, the **Journal of the European Ceramic Society (JECS)** or **Open Ceramics** are to be consulted in respect to any plans for publication.

### 2. Responsibility

The responsibility for the organisation of the project lies with the Receiving Party. Any financial or other claim arising from the project is the concern of the Receiving Party.

### 3. Advertising

Any paper/advertising/etc. in relation with the project must acknowledge the contribution of the Trust. The logo of the Trust must be displayed or, if no such illustration is possible, a written reference must be made to the Trust contribution.

### 4. Budget

In the present contract, the maximum amount allowed for the project will be of **5250 €**. This sum is based on the budget defined in Annex 2 as prepared by the Receiving Party and agreed by the Trust.

If the receiving party asks for it, 50 % of that sum can be given in advanced, 4 months before the beginning of the project.

No supplement will be given if the project costs exceed the agreed sum.

#### **5. Expense Statement**

At the end of the project, the Receiving Party must complete an Expense Statement. A single table is to be filled out for the entire project and completed with proofs of the actual expenses incurred, which must be within the sums indicated in Annex 2. An Expense Statement that is not signed or that is not accompanied by original documents or, if not, by certified photocopies cannot be accepted.

Funds will be available for only 60 days after the end of the project. It is therefore essential to turn in the Expense Statement in a timely manner. Late submission will result in no reimbursement.

If, for any reason, the project for which the fund is provided can not take place, the sums allowed in advance must be reimbursed as soon as the cancellation is confirmed. Any sum already engaged and not reimbursable by the Receiving Party must be explained in an Expense Statement and agreed by the Trust.

#### **6. Report**

In addition to the Expense Statement, the Receiving Party must write a full report presenting the achievements made for the projects. This report must be signed and send with the expense statement, at the end of the project. A short summary following the template available is also required on maximum one A4 page.

#### **7. Publication:**

**It is a condition of accepting this contract that any papers related to the sponsored project will be submitted to the new ECerS Open Access Journal: Open Ceramics.** If the paper is accepted by **Open Ceramics**, then the JECS Trust will pay the Article Publication Charge.

Please use the following sentence to acknowledge the JECS Trust when submitting your paper(s) to **Open Ceramics**: "*The authors are grateful to the JECS Trust for funding [the visit of xx to xx etc.] (Contract No. xx).*"

The determination of whether a paper is compatible with the content of **Open Ceramics** will be made by the Senior/Chief Editor of Open Ceramics. If **Open Ceramics** declines to publish them, the authors are then free to publish them in a different journal of their choice.

#### **8. Decision:**

In all cases, the decisions of the Trust shall be final.

#### **9. Disputes**

This Contract shall be governed by Belgian law. All disputes arising in connection with this Contract shall be finally settled under the Rules of Conciliation and Arbitration of the International Chamber of Commerce by 1 (one) arbitrator appointed in accordance with such Rules. The arbitration shall be held in Mons, Belgium, and shall be conducted in English.

Judgment upon the award rendered by the arbitrator may be entered in any court having jurisdiction.

In witness whereof, the Parties have executed 2 (two) original copies of this Contract on \_\_\_\_\_, each Party acknowledging receipt of one original copy.

JECS Trust

**FunGlass - Centre for Functional and Surface  
Functionalized Glass**

By \_

Name: Prof. P. Sajgalik

Title: Secretary

By \_

Name: **Józef Habánik**

Title: **Director**

JECS Trust

**FunGlass - Centre for Functional and Surface  
Functionalized Glass**

By \_

Name: Dr. Moritz von Witzleben

Title: President

By \_

Name: **Aleksandra Nowicka**

Title: Applicant

## **Annex 1 – The project**

**Stay of Aleksandra Nowicka in MATEIS**

**Acid corrosion surface modification of zirconia-based dental materials for enhanced osseointegration - Two stays of one month each (June and October 2021) + 1 short stay (December 2021) - MATEIS laboratory, INSA Lyon, France**

The proposed research/collaboration activity is dedicated to the study and evaluation of the acid corrosion surface modification of zirconia-based dental materials. The overall idea is to study the effect of different chemical treatments (acid nature and etching conditions) on zirconia-based ceramics used in the dental field. The scientific background of the planned exchange program can be outlined as follows. The superior flexural strength and fracture toughness of zirconia-based ceramics, combined with the possibility to be accurately processed to complex geometries using CAD–CAM technologies or low-pressure injection moulding is a very promising material in dental implantology and could be an alternative for titanium dental implants. The long-term success of dental implants greatly depends on the successful initial osseointegration shortly after implantation. Osseointegration is influenced by various factors involving both the host bone and the implant. As zirconia-based ceramics are not osteoinductive, the surface properties and topographical features are considered as a critical parameter for enhancing the osseointegration. Aside from the better osseointegration, implant surface modification could also increase cell viability. Surface treatment methods as sandblasting and acid etching are the most typical surface treatments currently applied to zirconia-based ceramic implants, mainly copied from procedures applied to titanium implants. Hence, chemical etching is currently performed at the industrial level by introducing sandblasted ceramic implants in very acidic solutions (nitric/hydrofluoric) for a relatively long time (3 hours) in order to get dual roughness features. Hydrofluoric acid is a very hazardous and harmful acid for human health. On the other side, sandblasting can increase the size of defects at the surface of the ceramic, compromising its mechanical properties. The sensitivity of zirconia-based dental ceramics to Low-Temperature Degradation phenomena (LTD) can be also affected, leading to microroughness and microcracking increase. The LTD, which is the spontaneous tetragonal (t) to monoclinic (m) zirconia phase transformation at the surfaces in contact with water (or body fluids in the case of implants) is accompanied with a volume increase of around 5%, which can progressively deteriorate the mechanical properties and increases the possibility of failures of implanted dental ceramics. Considering available surface modification methods and their side effects it is important to find a better and safer protocol to improve surface properties in zirconia-based dental ceramic materials for implant development. Moreover, there is a lack of knowledge (effect of sandblasting conditions, acid bath concentration, temperature and time of treatments, stirring, washing step, etc.) for guiding these industrial procedures aimed to increase the roughness. In the framework of this project, the applicant will mainly study: 1) The effect of different chemical treatments (etching conditions) on commercial zirconia-based ceramics used in the dental field (3Y-TZP) and recently developed Ceria-stabilized zirconia based composite (Ce-TZP composite). 2) The assessment of the impact of the induced surface roughness on the mechanical behaviour and LTD sensitivity. 3) The investigation and optimization of the combination of sandblasting and etching in order to create a dual surface roughness, closer to that of the natural bone. 4) Preliminary cell attachment tests 5) Based on the preliminary biological tests, mechanical resistance and LTD stability results, proposal of the optimal procedure for surface modification (chemical, physical or a combination). The research activities will be carried out at Alexander Dubček University of Trenčín and INSA Lyon as follows: 1) Alexander Dubček University of Trenčín, Slovakia: - Surface modification of zirconia-based ceramics by acid etching procedures - Surface modification of zirconia-based ceramics by combination of acid etching and sandblasting procedures - Modified surface characterization (Atomic Force Microscopy (AFM), wettability characterization, X-ray Diffraction (XRD), Scanning Electron Microscopy (SEM), Raman spectroscopy) 2) Institut National des Sciences Appliquées de Lyon, Lyon, France: - LTD behaviour of samples with different surface modifications (Accelerating aging tests – AAT, phase analysis – XRD) - Mechanical characterization of modified ceramics (hardness, biaxial bending, 4 point bending, toughness) - Cell adhesion and proliferation tests..

## Annex 2 – Budget in €

<b>(a) Costs associated with the research. Please consult the guidelines before completion.</b>	<b>1000 €</b>
Use of facilities and consumables at host institution: Maximum 500€/month.	1000 €
Exceptional costs. Awarded only with full justification.	
<b>(b) Travel/ subsistence costs:</b>	<b>4.250 €</b>
Travel	1000 €
Subsistence 50€/day	3250 €

**Total amount allowed by the JECS Trust: 5250 €**

**Remark from the JECS Trust board:**

Only 2 travels allowed (1.000 € of travel expenses allowed).

**Bank account details:**

<b>Name of the bank account holder:</b>	Alexander Dubček University of Trenčín
<b>IBAN:</b>	
<b>BIC:</b>	