

**Zmluva o poskytnutí finančných prostriedkov na čiastočné pokrytie cestovných a stravných náhrad
súvisiacich s výskumno-vzdelávacím pobytom doktorandov**

č. 03/STT/2022

medzi

inštitúciou

1. Trenčianska univerzita Alexandra Dubčeka v Trenčíne

Centrum pre funkčné a povrchovo funkcionalizované sklá (FunGlass)

Študentská 2, 911 50 Trenčín

Slovenská republika,

ktorú za účelom podpisu zmluvy zastupuje: doc. Ing. Jozef Habánik, PhD., rektor a vo veci zmluvných podmienok: prof. Ing. Dušan Galusek, DrSc., riaditeľ Centra FunGlass

a

účastníkom (študentom)

2. Fulden Dogrul

Stupeň vzdelávania: EQF level 8 – doktorandský

Študent s: ☐ finančnou podporou inštitúcie JECS Trust

Prehlásenie účastníka o bankovom účte:

Prehlasujem na svoju česť, že držiteľom bankového účtu, na ktorý budú prevedené finančné prostriedky je:

Zmluvné strany sa dohodli na osobitných podmienkach a prílohách, ktoré tvoria neoddeliteľnú súčasť tejto zmluvy.

Popis činnosti:

Predmetom výskumno-vzdelávacieho pobytu doktoranda sú aktivity definované v rámci grantovej zmluvy č. 2021281 uzatvorenej medzi JECS Trust, Gouverneur Cornez 4, 7000 Mons, Belgicko a Centrom FunGlass Trenčianskej univerzity Alexandra Dubčeka v Trenčíne, Študentská 2, 911 50 Trenčín s prílohou č. 1 *Stay of Fulden Dogrul in University of Sevilla – Advanced ceramics with eutectic microstructure for high-temperature applications*. (ďalej Grantová zmluva č. 2021286).

Pobyt je realizovaný na partnerskej inštitúcii Centra FunGlass:

- | | |
|------------|--|
| Príloha I | Grantová zmluva č. 2021286 uzatvorená medzi JECS Trust a Centrom FunGlass Trenčianskej univerzity Alexandra Dubčeka v Trenčíne, Študentská 2, 911 50 Trenčín s prílohou č. 1 <i>Stay of Fulden Dogrul in University of Erlangen Nuremberg – Polymer-derived Biosilicate-C composite scaffolds : the influence on angiogenic and osteogenic differentiation</i> . |
| Príloha II | Individuálny vzdelávací plán |

OSOBITNÉ PODMIENKY

ČLÁNOK 1 – PREDMET ZMLUVY

- 1.1 Inštitúcia poskytne účastníkovi finančné prostriedky na úhradu cestovných a stravných náhrad súvisiacich s realizáciou mobilného výskumno-vzdelávacieho pobytu v zmysle Prílohy I.
- 1.2 Účastník **súhlasí s podporou** stanovenou v článku 3.1 a **zaväzuje sa realizovať aktivity v súlade s popisom uvedeným v Grantovej zmluve č. 2021281 (Príloha I) a Individuálnom vzdelávacom pláne (Príloha II).**
- 1.3 Akékoľvek dodatky k tejto zmluve, vrátane zmien v dátumoch začiatku a ukončenia pobytu, musia byť vyžiadané a odsúhlasené oboma stranami prostredníctvom oficiálneho oznámenia listom alebo e-mailom.

ČLÁNOK 2 – PLATNOSŤ ZMLUVY A TRVANIE POBYTU

- 2.1 Zmluva medzi účastníkom a TnUAD sa pripravuje na základe platnej Grantovej zmluvy podpísanej všetkými zúčastnenými stranami: inštitúciou JECS Trust, účastníkom a TnUAD.
- 2.2 Táto zmluva nadobúda platnosť a účinnosť dňom jej podpisu poslednou z oboch zmluvných strán.
- 2.3 Pobyt bude realizovaný v zmysle **Grantovej zmluvy č. 2021281 v maximálnej dĺžke 90 dní**. Prípadné zmeny dátumu začiatku a konca mobility účastník konzultuje s inštitúciou JECS Trust.
- 2.4 Účastník **dostane finančnú podporu zo zdrojov inštitúcie JECS Trust.**

ČLÁNOK 3 – FINANČNÝ PRÍSPEVOK

- 3.1 Výška finančného príspevku na pobyt je v zmysle Grantovej zmluvy č. 2021281 – **6 100,00 EUR**. Z toho je **1 500,00 EUR** určených na použitie prístrojového vybavenia a spotrebného materiálu na hosťujúcej inštitúcii; pokrytie cestovných náhrad súvisiacich s realizáciou pobytu je **4 600,00 EUR** a zodpovedá sume **100,00 EUR/ cestovné náhrady na pobyt a 50,00 EUR na 1 deň/ stravné náhrady** (celkovo pobyt trvá 90 kalendárnych dní). Bližšie informácie – vid' Príloha I.
- 3.2 Centrum FunGlass TnUAD v Trenčíne uhradí hosťujúcej inštitúcii príspevok v sume 1 500,00 EUR na použitie prístrojového vybavenia a spotrebného materiálu a príslušnú dokumentáciu o úhrade doloží do *Vyhlásenia o výdavkoch* požadujúceho inštitúciou JECS Trust.
- 3.3 **Podmienky vyplatenia príspevku sú definované v Článku 4 Podmienky platby.**
- 3.4 Centrum FunGlass TnUAD vyplatí účastníkovi príspevok podľa Čl. 4.1 po obdržaní Grantovej zmluvy JECS Trust podpísanej všetkými zúčastnenými stranami a obdržaní preddavku z JECS Trust na účet TnUAD.
- 3.5 V prípade, že **náklady na projekt presiahnu** dohodnutú sumu, účastníkovi **nebude poskytnutý žiadny doplatok**.
- 3.6 V prípade **prerušenia, resp. predčasného ukončenia** pobytu účastníkom, sa účastník a Centrum FunGlass riadi pravidlami financovania mobilného projektu (Príloha I) inštitúcie JECS Trust. V prípade podmienky vrátenia príspevku alebo jeho alikvotnej čiastky, účastník je povinný vrátiť danú čiastku na účet TnUAD do 10 dní od rozhodnutia zo strany Centra FunGlass TnUAD v Trenčíne.

ČLÁNOK 4 – PODMIENKY PLATBY

- 4.1 Inštitúcia vyplatí **so súhlasom účastníka jednu splátku vo výške 3 220,00 EUR na cestovné a stravné náhrady**, (čo predstavuje 70% príspevku na uvedený pobyt) účastníkovi najneskôr **do 24. mája 2022**.
- 4.2 Vyplatenie **doplatku účastníkovi vo výške 1 380,00 EUR** (čo predstavuje 30% príspevku na uvedený pobyt) bude uskutočnené **na základe uznania Vyhlásenia o výdavkoch a Krátkej správy o mobilnom projekte** inštitúciou JECS Trust tak ako je uvedené v Grantovej zmluve č. 2021281 a odovzdaním vyhodnoteného Individuálneho vzdelávacieho plánu administratívemu pracovníkovi Centra FunGlass.
- 4.3 Účastník má **10 pracovných dní** od ukončenia pobytu na **dodanie požadovaných dokladov** potrebných na uznanie nákladov spojených s mobilným projektom.
- 4.4 Zaslanie vyššie uvedených dokladov inštitúcii JECS Trust zabezpečuje príslušný pracovník administratívy Centra FunGlass TnUAD.
- 4.5 TnUAD v Trenčíne má 10 pracovných dní na vyplatenie doplatku účastníkovi odo dňa uznania *Vyhlásenia o výdavkoch a Krátkej správy o mobilnom projekte* inštitúciou JECS Trust v zmysle bodu 4.3.
- 4.6 V prípade neuznania *Vyhlásenia o výdavkoch* alebo *Krátkej správy o mobilnom projekte* inštitúciou JECS Trust sa účastník a Centrum FunGlass TnUAD v Trenčíne riadia usmerneniami inštitúcie JECS Trust.

ČLÁNOK 5 – POISTENIE

- 5.1 Osobou zodpovednou za relevantné poistenie v krajine partnerskej inštitúcie je účastník.
- 5.2 Centrum FunGlass neposkytuje účastníkovi príspevok na poistenie.
- 5.3 Poistenie závisí od právnych a administratívnych ustanovení príslušnej prijímajúcej krajiny a inštitúcie.

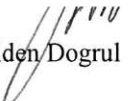
ČLÁNOK 6 – JURISDIKCIA A PRÍSLUŠNOSŤ SÚDU


- 6.1 Zmluva o poskytnutí finančnej podpory sa riadi právnym poriadkom Slovenskej republiky a Európskej únie.
- 6.2 O nezhodách medzi inštitúciou a účastníkom, ktoré sa týkajú interpretácie, použitia a platnosti zmluvy a ktoré nie je možné vyriešiť vzájomnou dohodou, rozhoduje príslušný súd v súlade so zákonom.

PODPISY

Za účastníka

Za TnUAD v Trenčíne


Fulden Dogrul


Doc. Ing. Jozef Habánik, PhD.



Secretariat – C/O ECerS
Avenue Gouverneur Cornez, 4
B-7000 MONS (Belgium)

Contract 2021281

This contract is established following the decision of the JECS Trust Board of 8th February 2022. 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 Alexander Dubček University of Trenčín, FunGlass (Centre for Functional and Surface Functionalized Glass) incorporated under the laws of Slovakia, and having its registered office at Študentská 2, 911 50 Trenčín - Slovakia.

Purpose of the Contract

The JECS Trust will provide funds in connection with a project **"Stay of Fulden Dogrul in University of Erlangen Nuremberg - Polymer-derived Biosilicate-C composite scaffolds: the influence on angiogenic and osteogenic differentiation"**, defined in Annex 1 hereto (the "Project").

The JECS Trust and the **Alexander Dubček University of Trenčín, 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 **Alexander Dubček University of Trenčín, 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 **6100 €**. 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

By _____

Name: Prof. Jon Binner

Title: President

JECS Trust

By _____

Name: Prof. Anne Leriche

Title: Secretary

Alexander Dubček University of Trenčín, FunGlass
(Centre for Functional and Surface Functionalized Glass)

By _____

Name: Jozef Habánik

Title: Rector

Alexander Dubček University of Trenčín, FunGlass
(Centre for Functional and Surface Functionalized Glass)

By _____

Name: Fulden Dogrul

Title: Applicant

Annex 1 – The project

Stay of Fulden Dogrul in University of Erlangen Nuremberg

Polymer-derived Biosilicate-C composite scaffolds: the influence on angiogenic and osteogenic differentiation - 01/04/2022 to 30/06/2022 - Institute of Biomaterials, Department of Materials Science and Engineering, University of Erlangen Nuremberg, Germany

Carbon-based materials have received great attention in biomedical applications. Owing to its unique chemical and physical properties, carbon-based materials, such as carbon nanotubes (CNT), graphene oxide (GO) and its derivatives, have been extensively investigated in various biological applications including drug delivery, bone-tissue engineering, diagnosis, and cancer therapy. In our last research, we demonstrated that Biosilicate-Carbon composite foams, fabricated via polymer-derived ceramic (PDCs) route, enable to heat rapidly up to 70°C 625s under infrared irradiation. That monitored temperature is significantly important since disinfection temperature of common bacteria is at around 55°C. Because of this absorption properties, Biosilicate-Carbon composites are promising candidate for photothermal therapy/photodynamic therapy (PTT/PDT). Additionally, polymer-derived Biosilicate like glass-ceramic and Biosilicate Carbon composite exhibited antibacterial effect against *S. aureus* and *E. coli* and lack of cytotoxicity on ST2 stromal cell line as well as bioactivity when they were immersed in simulated body fluid. On the other hand, angiogenesis is a key challenge in bone regeneration. Previous studies demonstrated that silicate-based bio-ceramics, including calcium silicate (CS), could stimulate angiogenesis while coating biopolymer nanofibers with carbon nanotubes accelerates tissue healing and bone regeneration. In addition, it was identified that graphene oxide coated 3D printed scaffolds showed improved properties for promoting osteogenesis compared to non-coated ones. Vascular endothelial growth factor (VEGF) is a critical regulator in physiological angiogenesis as well as playing a significant role in skeletal growth and repair. Moreover, it has been shown, angiogenic markers, as well as activity of alkaline phosphatase (ALP), which is generally used as an indicator of early differentiation of osteoblast-like cells were higher in calcium silicate scaffolds when they were reinforced mechanically by graphene. Besides the mechanical properties, surface roughness also emerges as another cause of the osteoinductivity of graphene and its derivatives. It has been explored that due to a large surface area and chemical interactions, graphene (and its derivatives) incorporated materials can absorb biomolecules or proteins, which have osteogenic effects on the differentiation of surrounding cells. Additive manufacturing technology is one of the 3D scaffold production method which enables to control geometry in macro/micro scale to fulfil the requirements for mimicking natural bone structure. In other words, perfect porosity and interconnectivity for the cell transportation and nutrient diffusion, can be perfectly controlled by 3D printing techniques. This work is aiming at investigation of angiogenic and osteogenic differentiation of 3D printed Biosilicate-C composite scaffolds obtained by means of direct ink writing (DIW) and stereolithography techniques. Angiogenic and osteogenic differentiation of 3D scaffolds will be examined by vascular endothelial growth factor (VEGF) activity and alkaline phosphatase (ALP) activity. Additionally 3D printed Biosilicate - C composites will be fabricated by polymer-derived ceramics route in which preceramic polymers (namely silicones, such as H44, Silres® MK) are used as the source of silica. Preceramic polymers are so sensitive to firing atmosphere that, in inert atmosphere, they transform into amorphous silicon oxycarbide (SiOC), i.e. silica glass, featuring both Si-O and Si-C bonds along with free carbon nanosheets, formed directly "in-situ". In addition, firing preceramic polymers in air yields pure SiO₂. By mixing silicones with suitable fillers, (in this work the sources of Na₂O, CaO, and P₂O₅), bio-ceramics with a well-defined crystalline phase such as Biosilicate® glass-ceramics (Na₂CaSi₂O₆) can be prepared. Hereby, 3D printed samples (green body), heat treated in air or in N₂ atmosphere, transform to products resembling Biosilicate glass-ceramic embedded in a silico-phosphate glass matrix with and without free carbon. In this regard, this research activity planned to be carried out in two different institutes due to lack of enough facilities in main institute; - Production (fired in air : Biosilicate glass-ceramic and in N₂ : Biosilicate-C composite) and characterization of 3D printed scaffolds will be carried out in the University of Padova/Italy under the supervision of Prof. Enrico Bernardo (in the framework cotutelle agreement). X-ray diffraction (XRD), Scanning Electron Microscopy (SEM) and mechanical properties will be analysed to reach scaffold requirements for bone tissue regeneration. Fabricated scaffolds will be biologically examined by alkaline phosphatase enzyme activity (ALP Activity), alizarin red staining for osteogenic differentiation and vascular endothelial growth factor (VEGF Activity) for angiogenic differentiation in mentioned host institute (FAU) under the supervision of Prof. Aldo R. Boccaccini.

Annex 2 – Budget in €

(a) Costs associated with the research. Please consult the guidelines before completion.	1500 €
Use of facilities and consumables at host institution: Maximum 500€/month.	1500 €
Exceptional costs. Awarded only with full justification.	
(b) Travel/ subsistence costs:	4600 €
Travel	100 €
Subsistence 50€/day	4500 €

Total amount allowed by the JECS Trust: 6100 €

JECS Trust board agrees to allow 6100 € with the following remark:

- As the applicant is involved in a EU project, the JECS Trust board ask her employer to certify that there will be no double funding for this stay/project.

Bank account details:

Name of the bank account holder:	Alexander Dubček University of Trenčín
IBAN:	
BIC:	



FunGlass

Centre for Functional and Surface Functionalized Glass
Alexander Dubček University of Trenčín
Študentská 2, 911 50 Trenčín, Slovak Republic

Training Plan

Trainee's name	Fulden Doğrul
Position	PhD student
Start of the training	04.04.2022
End of the training	30.06.2022
Host institution	Institute of Biomaterials at the Department of Materials Science and Engineering, University of Erlangen-Nuremberg, Germany
Person responsible for training	Prof. Dr.-Ing. habil. Aldo R. Boccaccini Head of the Institute of Biomaterials and Marcela Orango Ospina
Contact person in the host institution	Prof. Dr.-Ing. habil. Aldo R. Boccaccini

Polymer-derived Biosilicate-C composite scaffolds: the influence on angiogenic and osteogenic differentiation.

Angiogenesis is a key challenge in bone regeneration. Silicate-based bio-ceramics, including calcium silicate (CS) could stimulate angiogenesis as well as coatings biopolymer nanofibers with carbon nanotubes accelerates tissue healing and bone regeneration. In addition, it was identified that graphene oxide coated 3D printed scaffolds showed improved properties for promoting osteogenesis compared to non-coated ones. Vascular endothelial growth factor (VEGF) is a critical regulator in physiological angiogenesis as well as it also plays a significant role in skeletal growth and repair. Moreover, it has been shown, angiogenic markers, as well as activity of alkaline phosphatase (ALP), which is generally used as an indicator of early differentiation of osteoblast-like cells were higher in calcium silicate scaffolds when they were reinforced mechanically by graphene. It has been explored that due to a large surface area and chemical interactions, graphene (and its derivatives) incorporated materials can absorb biomolecules or proteins, which have osteogenic effects on the differentiation of surrounding cells. Additive manufacturing technology is one of the 3D scaffold production method which enables to control geometry in macro/micro scale to fulfil the requirements for mimicking natural bone structure. In other words, perfect porosity and interconnectivity for the cell transportation and nutrient diffusion, can be perfectly controlled by 3D printing techniques.

This work is aiming at investigation of angiogenic and osteogenic differentiation of 3D printed Biosilicate-C composite scaffolds obtained by means of stereolithography techniques. Angiogenic and osteogenic differentiation of 3D scaffolds will be examined by vascular endothelial growth factor (VEGF) activity and alkaline phosphatase (ALP) activity.

Research infrastructure specific training**

Training activity*	Description	Mentor	Completed (Date/Signature)
Bibliographic Research	Reviews and papers about the topics in which will get trained		
Safety Induction	Complete induction for general safety, fieldwork safety and laboratory safety	Heinz Mahler	
Lab Induction (Cauerstr.)	Laboratory rules, equipment, chemicals disposition, waste disposal, etc. in Cauerstr building	Heinz Mahler	
Lab Induction (Ulrich-Schalkstr.)	Laboratory rules, equipment, chemicals disposition, waste disposal, etc. in Ulrich Schalk building	Alina Gruenewald	
Cell culture induction	Induction to carry out cell culture tests	Alina Gruenewald	
ALP assay	Angiogenic behaviour of Biosilicate-C composite	Marcela Ospina	
VEGF assay	Osteogenic behaviour of Biosilicate-C composite	Marcela Ospina	

*Add lines when necessary

** this training plan is subject to changes following COVID-19 restrictions

Lectures

Lecture*	Description	Lecturer	Duration (h)	Completed (Date/Signature)

*Add lines when necessary

Research activities

Activity*	Description	Trainer	Completed (Date/Signature)

*Add lines when necessary

Research papers

Title/reference*	Abstract	Submitted	Accepted

*Add lines when necessary

Professional development competencies / FunGlass strategic initiatives (grant proposals, presentations, project management, outreach/hiring activities, HRS4R, management of advanced research facilities, joint doctoral program, innovation management, industry collaboration...)

Competence/initiative	Description	Submitted	Accepted

*Add lines when necessary

Attachment: Characterization of work to be done - working plan.