Search for a Spanish Partner for a Bilateral R&D Project

Organization	
Date of Request:	19th of November 2022
Company name:	College of Dental Medicine/University of Sharjah
Contact person and title/ designation:	Dr. Mohannad Nassar, Associate Professor
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SECTION 1: Entity launching the partner search *(Please give brief / to the point explanations. For more explanation on any point below, you may add a short paragraph as an annexure, with this document.)*	
Sector	Education and Research
Entity mission or core functions	Besides its mission in providing world-class educational and research experience, the University of Sharjah is also focusing on becoming a regional and global benchmark for excellence in sustainability at its all dimensions including the environmental aspect.
Date of establishment	October 1997
Ownership (if public and traded, add stock exchange and ticker symbol)	Semi government
Total number of employees	2423
Number of employees in R&D	995
Key products sold or services provided	Education, research, community service, development programs, consultation services, academic advising, financial aids, counselling, career services, health centers, students' activities, and recreational sports.
Entity core technical competences	Training, development, strategic management, collaborative working, marketing, adaptability, and continuous improvement.
Key R&D programs and activities	Research and Development in Medicine and Open Source Software.

Examples of accomplishments	5th place in the Middle East in the field of sustainability as per "UI GreenMetric" organization, and number 81 out of 1050 international universities.
Company strategic orientation	The University of Sharjah is aiming for international recognition in sustainable research that serves the community whilst having the least negative impact on the environment.

SECTION 2: Spanish Company Profile *(Please provide a brief summary of the prospective partner company or organization. This summary may address some or all of the points below)*	
Profile of ideal technology partner	**Chemistry Research Centre** Chemistry Research Centre with the goal of development, innovation and technology transfer in the field of chemistry, specifically green and environmentally friendly chemistry.
Core technological competencies and expertise	An ideal technology partner in the field of chemistry with the expertise and equipment needed for chemical agents' extraction from natural resources and modification of the extracted product to a gel consistency. It is preferred that the partner has also the capability of evaluating the chemical and physical characteristics of the product in its final gel formulation.
Other essential qualifications (e.g.: ownership, track records etc.)	It is desirable that the partner has goals for promoting and developing sustainable chemistry solutions, avoiding waste, hazardous chemicals, and making better use of natural resources with an emerging concept aims to establish a holistic approach, which promotes the use of environmentally sustainable alternatives whilst also supporting economic innovation.
If you have a list of companies with whom you are in contact or interested in contacting, please provide contact details	1. The Institute of Chemical Research of Catalonia (ICIQ). Phone +34977920200 Phone +34977558000 https://www.iciq.org/ http://www.ceics.eu/en/the-institute-of-chemical-research-of-catalonia-iciq- Email: info@ceics.eu 2. SusChem-ESPAÑA is the Spanish Technology Platform for Sustainable Chemistry which is part of SusChem, the European

	Technology Platform for Sustainable Chemistry. It is a forum that brings together industry, academia, policy makers and the wider society. This is not based in Spain, but they have multiple collaborators there. https://www.suschem-es.org/ https://www.suschem-es.org/congress/sustainablechemistry-zgz2017/organization.html 3. Research Unit on Bioactive Molecule (RUBAM): an active research group based at the Institute of Advanced Chemistry of Catalonia (IQAC), which belongs to the Spanish National Research Council. https://www.rubam.net/ Tel: +34934006100, ext: 1215 Email: info@rubam.net Principal Investigator: Dr. Gemma Fabriàs Email: gemma.fabrias@iqac.csic.es Tel: +34934006130 4. Center for Research in Sustainable Chemistry https://uhu-ciqso.es/ Tel: 959 219 323 5. Centro Singular de Investigación en Química Biológica y Materiales Moleculares (CiQUS). https://www.usc.es/ciqus/es email: ciqus@usc.es Tel: +34881815700 6. Institute for Chemical Research (IIQ) Director: Dr. Noureddine Khiar el Wahabi https://www.iiq.us-csic.es/en/introduction Email: khiar@iiq.csic.es Tel: 954489559 7. Institute for Advanced Research in Chemistry. https://www.iadchem.uam.es/contact/ E-mail: iadchem@uam.es Tel: +34914976306 8. Sustainable Synthesis and Catalysis Group at University of Murcia. Group leader: Francisco Juliá-Hernández Email: francisco.julia@um.es

If you are interested in collaboration: please specify details and other important information you want to share with a potential company	Several synthetic acids are used in the dental field especially in adhesive dentistry in which an acid is needed for optimal bonding between the tooth filling and tooth structure. Unfortunately, most of these acids have direct or indirect deleterious effect on the environment and probably on the health of patients in case of improper use. IP6 is the major storage form of phosphorus in plants' seeds and bran. The high negative charges in its structure give IP6 unique properties that lend it to several applications in the dental field. The usual source of IP6 extraction is rice bran. Rice bran is considered a by-product of white rice industry which usually goes as a waste or cattle feed. The attention to green and environmentally friendly dentistry has increased lately. Unfortunately, the overall impact of dentistry on the environment is negative, thus several international dental associations are urging dental researchers to come up with dental materials that are not harmful to the planet eco-system. I personally have been studying IP6 in the dental field for the last 10 years and the data I collected are too compelling to be ignored (references are mentioned below). I usually use IP6 which I buy from Sigma Aldrich that comes in a solution form. However, at the dental clinics, we prefer to use acids on the tooth surfaces in gel form for better control of the material and precise placement. Thus, the next step of my project is innovating a dental material based on IP6; first through extraction of IP6 from a natural source and then transforming it to a certain gel consistency with certain color. **References:** 1. Nassar M, Nassar R, Maki H, Al-Yagoob A, Hachim M, Senok A, Williams D and Hiraishi N. Phytic Acid: Properties and Potential Applications in Dentistry. Front Mater. 2021;8:638909. 2. Nassar M, Hiraishi N, Islam MS, et al. Effect of phytic acid used as etchant on bond strength, smear layer, and pulpal cells. Eur J Oral Sci. 2013;121(5):482-487.

	3. Nassar M, Hiraishi N, Tamura Y, Otsuki M, Aoki K, Tagami J. Phytic acid: an alternative root canal chelating agent. J Endod. 2015;41(2):242-247. 4. Kong K, Islam MS, Nassar M, et al. Effect of phytic acid etchant on the structural stability of demineralized dentine and dentine bonding. J Mech Behav Biomed Mater. 2015;48:145-152. 5. Nassar R, Nassar M. Antimicrobial effect of phytic acid on Enterococcus faecalis. Int Arab J Antimicrob Agents. 2017;6:1-7. 6. Kong K, Hiraishi N, Nassar M, Otsuki M, Yiu CKY, Tagami J. Effect of phytic acid etchant on resin-dentin bonding: Monomer penetration and stability of dentin collagen. J Prosthodont Res. 2017;61(3):251-258. 7. Nassar M, Hiraishi N, Islam MS, Romero MJ, Otsuki M, Tagami J. Effect of phytic acid as an endodontic chelator on resin adhesion to sodium hypochlorite-treated dentin. Restor Dent Endod. 2020;45(4):e44. 8. Forgione D, Nassar M, Seseogullari-Dirihan R, Thitthaweerat S, Tezvergil-Mutluay A. The effect of phytic acid on enzymatic degradation of dentin. Eur J Oral Sci. 2021;129(2):e12771. 9. Muana, H.L., Nassar, M., Dargham, A., Hiraishi, N., and Tagami, J. Effect of smear layer removal agents on the microhardness and roughness of radicular dentin. Saudi Dent J. 2021;33(7):661-665. 10. Nassar R, Nassar M, Vianna ME, Naidoo N, Alqutami F, Kaklamanos EG, Senok A and Williams D. Antimicrobial Activity of Phytic Acid: An Emerging Agent in Endodontics. Front Cell Infect Microbiol. 2021;11:753649. 11. Forgione D, Nassar M, Seseogullari-Dirihana R, Jamleh A, Tezvergil-Mutluayae A. Effect of phytic acid on dentinal collagen solubilization and its binding and debinding potentials to dentin. J Dent. 2023;128, 104361.
Interested areas of collaboration	Chemistry
Specific R&D contribution you are seeking/offering	The extraction of phytic acid from natural resources such as rice bran or wheat gluten and then turning it into a gel consistency with certain color for dental application.

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Signature
Name: Mohannad Nassar
Date: 19th of November 2022