

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

Organization	
Date of Request:	26 October 2026
Company name:	Egyptian Atomic Energy Authority
Contact person and title/ designation:	Prof.Dr/ Reham Elsayed Hassan, professor of inorganic chemistry, Hot Lab Center, Egyptian Atomic Energy
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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	Research & Development / sustainable water recovery and reuse / Environmental Remediation / advanced functional materials / radioactive waste management
Entity mission or core functions	The Egyptian Atomic Energy Authority is a public scientific institution involved in the peaceful applications of nuclear science and technology. The proposed project is intended to strengthen applied research and technology development for the removal of radioactive and toxic contaminants from industrial wastewater, with particular emphasis on naturally occurring radioactive materials (NORM) in petroleum-produced water.
Date of establishment	1955
Ownership (if public and traded, add stock exchange and ticker symbol)	Public-sector governmental research institution in Egypt.
Total number of employees	More than 3000
Number of employees in R&D	More than 2000
Key products sold or services provided	Applied nuclear and radiochemical research; radioactive waste characterization and management; analytical and

	environmental monitoring services; development and evaluation of functional materials for contaminant removal; and research into technologies for environmental remediation.
Entity core technical competences	• Inorganic and analytical chemistry. • Development and characterization of advanced adsorbents, hybrid composites, and functional materials. • Sorption and selective separation of toxic metal ions and radionuclides. • Radiochemical analysis and radioactive waste management. • Evaluation of treatment performance under complex aqueous conditions. • Environmental characterization of water and other environmental matrices. • Research on selective radium recovery and remediation of NORM-contaminated industrial wastewater.
Key R&D programs and activities	The proposed research focuses on developing salinity-tolerant hybrid functional materials for selective removal and recovery of radium isotopes, particularly Ra-226 and Ra-228, from petroleum-produced water containing high concentrations of dissolved salts and competing ions. The work includes material synthesis and characterization, laboratory-scale treatment studies, adsorption and regeneration assessment, and evaluation of treated water for potential reuse. The project is intended to establish a collaborative research and industrial development pathway with a Spanish water-treatment company capable of engineering and constructing pilot-scale treatment systems.
Examples of accomplishments	Research activities include the development of functional hybrid materials for the removal of toxic metals and radionuclides from aqueous media, research on radioactive waste treatment, and participation in international research collaboration.
Company strategic orientation	The proposed collaboration aims to translate scientific research into a practical environmental technology that supports radioactive contaminant control, industrial water recovery, resource efficiency, and circular water management. The strategic objective is to develop a regenerable hybrid treatment process that can be integrated into an engineered pilot unit and evaluated for its technical feasibility, environmental safety, and potential industrial deployment.

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	We are seeking an established Spanish industrial company specializing in advanced industrial wastewater treatment, produced-water treatment, water recovery and reuse, and the engineering, design, manufacturing, construction, installation, and commissioning of pilot-scale and industrial-scale water treatment plants. The ideal partner should have proven experience in developing integrated treatment systems for complex industrial effluents characterized by high salinity, elevated concentrations of dissolved salts, competing ions, and potentially hazardous contaminants. The partner should have the engineering and manufacturing capacity to integrate an innovative hybrid adsorbent developed by the Egyptian research team into a regenerable, modular, pilot-scale treatment unit suitable for testing under realistic operating conditions.
Core technological competencies and expertise	The prospective Spanish partner should demonstrate expertise in the following areas: 1. Engineering design, fabrication, installation, and commissioning of pilot-scale and modular treatment plants. 2. Treatment of high-salinity water containing competing ions, particularly sodium, calcium, magnesium, strontium, and barium. 3. Integration of adsorption, ion-exchange, filtration, membrane separation, and other appropriate treatment technologies. 4. Process automation, monitoring, instrumentation, and performance evaluation. 5. Pilot testing, process scale-up, engineering design, and preparation for future industrial deployment. 6. Assessment of operational costs, energy consumption, material durability, waste generation, and overall process sustainability.
Other essential qualifications (e.g.: ownership, track records etc.)	• An established R&D, process engineering, or innovation department. • Demonstrated experience in designing and constructing treatment units rather than solely supplying laboratory equipment or providing consultancy. • Access to pilot facilities or the capacity to manufacture a customized pilot unit. • Experience in industrial collaboration, technology demonstration, and commercialization. • The technical capacity to work with the Egyptian team on

	process integration, testing, optimization, and scale-up.
If you have a list of companies with whom you are in contact or interested in contacting, please provide contact details	ACCIONA – Water Business – A major water-treatment company with an established water technology centre, pilot facilities, and experience in research, water purification, desalination, reuse, and industrial scale-up. Website: https://www.acciona.com/our-purpose/innovation/technology-innovation-centres/water I'mWATER Treatment Plants S.L. – A manufacturer of customized pilot plants, compact treatment systems, and industrial water-treatment equipment. Its pilot-plant engineering and manufacturing capabilities are particularly relevant to the proposed project. Website: https://www.imwater.es/en/pilot-plants/ Incro Water – An engineering company specializing in industrial wastewater treatment equipment and technologies for water recovery and reuse, including zero-liquid-discharge solutions. Website: https://incrowater.com/en/ SETA PHT – A Spanish company specializing in water-treatment plant design, manufacturing, assembly, commissioning, and turnkey projects. Its technologies include filtration, membrane processes, and ion exchange. Website: https://www.setapht.com/en/compan
If you are interested in collaboration: please specify details and other important information you want to share with a potential company	No financial contribution is being requested from the Spanish industrial partner. This programme supports collaborative research and innovation projects involving an Egyptian research institution, Spanish industrial partner, and Egyptian industrial partner with funding provided through the Science, Technology and Innovation Funding Authority (STDF) in Egypt and the Centre for the Development of Industrial Technology (CDTI) in Spain Call 11. The desired contribution is primarily technical, engineering, industrial, and application-oriented, including participation in the design and development of a pilot unit and assessment of its potential for industrial deployment. The Egyptian team will contribute scientific expertise in inorganic chemistry, functional material development, adsorbent synthesis and characterization, radionuclide separation, and radiochemical evaluation. The Spanish industrial partner is expected to contribute engineering expertise, process design, equipment integration, pilot-unit fabrication, operational optimization, and industrial scale-up. The collaboration will seek to integrate the developed hybrid material into a regenerable treatment system and evaluate its performance using representative petroleum-produced water under realistic salinity and

	competing-ion conditions. The project will also examine the treatment and management of the resulting residual streams.
Interested areas of collaboration	• Engineering and construction of a modular pilot-scale treatment unit. • Integration of the Egyptian-developed hybrid adsorbent into an industrial water-treatment process. • Selective radium removal and recovery from saline petroleum-produced water. • Integration with complementary treatment technologies. • Treatment and management of secondary waste and concentrated residual streams. • Assessment of potential water reuse, including agricultural reuse where permitted and supported by risk assessment. • Techno-economic evaluation, process optimization, and scale-up. • Preparation for industrial demonstration and future commercialization in Egypt and other relevant markets.
Specific R&D contribution you are seeking/offering	Contribution sought from the Spanish partner: Industrial process engineering, pilot-unit design and fabrication, integration of treatment technologies, instrumentation and process monitoring, pilot testing, technical optimization, scale-up assessment, and industrial application expertise. The partner is also invited to advise on operational requirements, manufacturability, maintenance, and the potential commercial deployment of the technology. Contribution offered by the Egyptian team: Development and characterization of advanced hybrid functional materials; laboratory-scale evaluation of selective radium removal; radiochemical and chemical assessment; investigation of the effects of salinity and competing ions; regeneration and performance studies; and evaluation of treated-water quality and potential reuse. Expected joint outcome: A scientifically validated and engineering-ready hybrid treatment concept, supported by pilot-scale testing, performance data, a preliminary techno-economic assessment, and a roadmap for future industrial demonstration and responsible water reuse.



Pro.Dr/ Reham Elsayed Hassan
26/10/2026

Egyptian Atomic
Energy Authority, Hot
Lab. Center



Industrial Research Partnership Proposal to SPANISH INDUSTRIAL PARTNER

Egyptian–Spanish Programme for Scientific and Technological Cooperation (ESIP 2026)

Project Title: Development of Advanced Hybrid Technology for Selective Radium Recovery and NORM Remediation from Petroleum-Produced Water Enabling Safe Water Reuse

Egyptian Research Partner: Egyptian Atomic Energy Authority (EAEA), Egypt

Proposed Spanish Industrial Partner: SPANISH INDUSTRIAL PARTNER, Spain

Proposed Duration: 24 months, subject to programme requirements and approval

Project Stage: Research and development, progressing toward laboratory-scale validation and industrial feasibility assessment

ESTIMATED BUDGET:

No direct financial contribution requested from SPANISH INDUSTRIAL PARTNER, **Our request is for technical collaboration, not financial support.** Fund will be provided through the Science, Technology and

Innovation Funding Authority (STDF) in Egypt and the Centre for the Development of Industrial Technology (CDTI) in Spain.

Project Overview and Industrial Rationale

Petroleum-produced water is a major industrial wastewater stream that may contain high concentrations of dissolved salts, competing ions, hydrocarbons, trace metals, and naturally occurring radioactive materials (NORM), particularly radium-226 and radium-228. These characteristics complicate treatment, increase waste-management requirements, and limit opportunities for water recovery.

This project proposes the development of an advanced hybrid sorbent combining pomegranate-peel-derived biochar with functionalized mesoporous silica incorporating selective binding groups. The objective is to investigate selective radium recovery under challenging high-salinity conditions and evaluate the feasibility of integrating the technology into a modular treatment process.

Beyond radionuclide removal, the project will assess the quality of treated water and investigate whether it could be suitable for agricultural reuse following any necessary additional treatment. Agricultural reuse will only be considered where chemical and radiological characterization, salinity and sodicity assessment, contaminant-risk evaluation, and applicable regulatory requirements demonstrate suitability.

The collaboration would combine EAEA's expertise in radionuclide separation, functional materials, analytical chemistry, and radioactive-waste management with SPANISH INDUSTRIAL PARTNER's potential contribution in water-treatment engineering, process integration, industrial requirements, and technology validation.

SCOPE AND WORK PLAN

Scope of Work

The project will develop and evaluate an advanced hybrid sorbent-based treatment technology for the selective removal of radium-226 and radium-228 from petroleum-produced water characterized by high salinity, competing ions, and other potentially hazardous contaminants. The Egyptian Atomic Energy Authority (EAEA) will lead the scientific and experimental activities, including hybrid-material development, physicochemical characterization, radiochemical analysis, adsorption optimization, regeneration studies, and secondary-waste assessment. SPANISH INDUSTRIAL PARTNER, as the proposed Spanish industrial partner, will contribute technical guidance on treatment-process configuration, fixed-bed system design, industrial integration, scalability, and preliminary techno-economic evaluation. The scope will also include comprehensive characterization of treated water to determine its potential suitability for appropriate reuse applications, including agricultural reuse where relevant, subject to radiological and chemical safety requirements, salinity and sodicity assessment, soil and crop risk evaluation, and compliance with applicable regulations. The project will conclude with an integrated technical and economic assessment to determine whether the technology is ready for further pilot-scale development.

RESEARCH APPROACH AND METHODOLOGY

Overall Research Strategy

The project aims to develop a practical, regenerable hybrid sorbent capable of selectively removing radium isotopes, from high-salinity petroleum produced water. The proposed material combines pomegranate-peel-derived biochar, mesoporous silica SiO_2 , 24-crown-8 macrocyclic ligands, and sulfonate functional groups follow a sequential feedstock → functional material → radium separation → regeneration → continuous treatment → economic

assessment pathway. Each component is selected to contribute a complementary function: biochar provides a low-cost porous support, mesoporous silica facilitates mass transfer and surface modification, crown ether groups provide a platform for investigating ion-recognition effects, and sulfonate groups introduce hydrophilic, negatively charged binding sites.

The scientific hypothesis is that a dual-recognition surface combining 24-crown-8 macrocyclic coordination sites with negatively charged sulfonate groups, immobilized on a chemically stable mesoporous silica layer supported by pomegranate-peel biochar. The use of an agricultural residue is intended to reduce dependence on expensive synthetic sorbent supports and increase the local-manufacturing potential of the technology. The silica layer will be optimized to avoid excessive coating that could block the pores of the biochar. A suitable 24-crown-8 derivative will be covalently immobilized on the silica surface. The macrocyclic cavity provides oxygen donor atoms capable of interacting with large cations. Sulfonate groups ($-\text{SO}_3^-$) will provide stable anionic sites under aqueous conditions and contribute to electrostatic/coordination interactions with Ra^{2+} . The combined 24-crown-8/sulfonate functionality is intended to create a dual-recognition environment rather than relying on nonspecific physical adsorption. **The research will proceed through five interconnected tasks.**

WP1: Produced-water characterization and treatment requirements

Activities and responsibilities: EAEA: Characterize representative or synthetic produced-water matrices for salinity, major competing ions, radium isotopes, and relevant chemical contaminants. SPANISH INDUSTRIAL PARTNER: Advise on industrial operating conditions and treatment requirements.

Expected deliverables: Baseline water-quality dataset and agreed performance criteria.

Indicative duration: Months 1–3

WP2: Hybrid sorbent development and characterization

Activities and responsibilities: EAEA: Develop and optimize candidate hybrid materials using locally available feedstocks and suitable functional components; assess structure, surface chemistry, stability, and sorption properties.

Expected deliverables: Candidate sorbents and laboratory characterization report.

Indicative duration: Months 2–8

WP3: Selective radium-removal performance

Activities and responsibilities: EAEA: Evaluate the effects of pH, contact time, salinity, initial radium concentration, and competing ions, including Na^+ , Ca^{2+} , Mg^{2+} , Sr^{2+} , and Ba^{2+} .

Expected deliverables: Validated removal data, selectivity assessment, and optimized operating conditions.

Indicative duration: Months 5–12

WP4: Fixed-bed treatment and regeneration

Activities and responsibilities: EAEA: Investigate continuous-flow treatment, breakthrough behaviour, regeneration efficiency, sorbent reuse, and the management of radionuclide-enriched secondary streams. SPANISH INDUSTRIAL PARTNER: Advise on hydraulic configuration and scale-up requirements.

Expected deliverables: Bench-scale fixed-bed assessment and regeneration/secondary-waste report.

Indicative duration: Months 9–16

WP5: Treated-water quality and reuse assessment

Activities and responsibilities: EAEA: Characterize treated water for residual radionuclides, salinity, sodicity, relevant contaminants, and other application-specific quality parameters. Assess potential reuse options, including agricultural reuse where appropriate, through risk-based evaluation. SPANISH

INDUSTRIAL PARTNER: Advise on treatment integration and industrial water-recovery requirements.

Expected deliverables: Treated-water quality report and conditional reuse-feasibility assessment.

Indicative duration: Months 12–18

WP6: Techno-economic assessment and pilot-readiness evaluation

Activities and responsibilities: Joint activity: Estimate material consumption, treatment costs, regeneration requirements, secondary-waste management costs, operational constraints, and potential integration scenarios. Define the requirements for a future pilot demonstration.

Expected deliverables: Preliminary techno-economic assessment, pilot concept, and recommendations for commercialization.

Indicative duration: Months 17–24

NEXT STEPS

The next step is to establish formal communication with SPANISH INDUSTRIAL PARTNER to secure its participation as the proposed Spanish industrial partner in the project, “Development of Advanced Hybrid Technology for Selective Radium Recovery and NORM Remediation from Petroleum-Produced Water Enabling Safe Water Reuse.” The proposed actions are as follows:

1. Submit the project proposal: Share the project summary, scope of work, work plan, expected industrial benefits, and proposed partnership model with SPANISH INDUSTRIAL PARTNER’s relevant R&D, water-treatment, or innovation team through its appropriate collaboration channel.
2. Arrange an initial technical meeting: Request an online meeting to present the project objectives, discuss the industrial challenges associated with radium-containing petroleum-produced water, and assess the relevance of the proposed

technology to SPANISH INDUSTRIAL PARTNER's expertise and strategic interests.

3. Define SPANISH INDUSTRIAL PARTNER's role: Agree on a practical contribution focused initially on technical consultation, process-engineering guidance, industrial performance criteria, and potential integration into existing water-treatment systems, without requesting upfront financial support.

4. Agree on the technical validation framework: Identify the key performance indicators, representative produced-water characteristics, testing requirements, treated-water quality criteria, and secondary-waste management considerations needed to evaluate the technology's industrial potential.

5. Establish a formal collaboration framework: If SPANISH INDUSTRIAL PARTNER expresses interest, prepare a Letter of Intent or Memorandum of Understanding defining the proposed collaboration, responsibilities, confidentiality, intellectual-property principles, and arrangements for sharing technical results, subject to the relevant institutional approvals.

6. Develop a pilot-scale roadmap: Following successful laboratory validation, jointly assess the feasibility of a pilot demonstration, including potential industrial applications, engineering requirements, indicative costs, and possible routes to commercialization.

Expected outcome: To obtain SPANISH INDUSTRIAL PARTNER's initial expression of interest and establish a clearly defined technical partnership that can progress from laboratory-scale research to potential industrial demonstration and future commercialization, subject to successful validation and mutual agreement.

SPANISH INDUSTRIAL PARTNER PARTNERSHIP MODEL

SPANISH INDUSTRIAL PARTNER is proposed as the Spanish industrial partner in the project, contributing its expertise in water-treatment engineering, process integration, and industrial technology validation to support the

development of an advanced hybrid technology for the selective recovery of radium-226 and radium-228 from high-salinity petroleum-produced water. Within this partnership, the Egyptian Atomic Energy Authority (EAEA) will lead the scientific research, hybrid sorbent development, radiochemical characterization, and laboratory-scale performance evaluation, while SPANISH INDUSTRIAL PARTNER will provide technical guidance on process configuration, fixed-bed treatment design, operational requirements, scalability, and the criteria required for future industrial implementation. The collaboration will also explore treated-water quality, secondary-waste management, and preliminary techno-economic feasibility to determine the potential for safe water recovery and appropriate reuse applications. The proposed partnership will initially follow a non-financial technical collaboration model, requiring no upfront funding commitment from SPANISH INDUSTRIAL PARTNER, with the possibility of progressing to a jointly evaluated pilot-scale demonstration and subsequent commercial arrangements, including technology licensing, treatment-system integration, or sorbent supply, subject to successful validation, mutual agreement, and the establishment of appropriate intellectual-property and commercialization terms. This approach offers SPANISH INDUSTRIAL PARTNER an opportunity to assess an emerging NORM-treatment technology at an early stage while helping shape its industrial relevance and potential application in petroleum-producing regions facing increasingly complex produced-water management challenges.

DIRECT COMMERCIAL AND TECHNICAL BENEFITS FOR SPANISH INDUSTRIAL PARTNER.

1. Expanding its industrial water-treatment services

The project could enable SPANISH INDUSTRIAL PARTNER to evaluate the addition of a specialized radium and NORM removal unit to its existing industrial water-treatment solutions. If the technology proves effective and market demand is demonstrated, SPANISH

INDUSTRIAL PARTNER could subsequently offer specialized treatment services to petroleum operators.

Business value: an opportunity to develop a new specialized service and diversify its industrial water-treatment portfolio.

2. Access to engineering data before investing

Instead of developing a technology entirely from scratch, SPANISH INDUSTRIAL PARTNER could contribute to defining realistic operating conditions, reviewing experimental results and evaluating a continuous-flow treatment unit.

Business value: reducing technical uncertainty before deciding whether to proceed with an industrial trial or larger investment, without assuming that the technology will necessarily succeed.

3. Integrating the technology into existing treatment plants

The proposed radium-removal unit could be designed as an additional treatment stage before or after selected separation, filtration or other treatment processes, depending on the water composition and experimental findings.

Business value: evaluating integrated treatment solutions that combine radioactive contaminant removal with salinity management and other treatment requirements, potentially without replacing the entire treatment plant.

4. Improving wastewater and secondary-waste management

The project aims to concentrate radioactive activity into a relatively small, controlled secondary stream that can be characterized and managed through an authorized waste-management route. It will also evaluate whether the treated water could be suitable for reuse after meeting all applicable requirements.

Business value: potential improvements in water recovery and waste management, provided that reduced waste volumes and lower overall costs are demonstrated against a baseline.

5. Agriculture Water reuse

The potential use of recovered water for irrigating suitable agricultural land near petroleum production facilities could create additional business opportunities through industrial–agricultural water partnerships, localized water-reuse infrastructure, and integrated water-management services. These applications could strengthen SPANISH INDUSTRIAL PARTNER’s competitive position in industrial water reuse and environmental remediation, support entry into emerging NORM-treatment markets, and generate replicable solutions for

oil-producing regions facing water scarcity and increasingly stringent environmental requirements.

6. Access to potential new markets

If the technology proves successful, SPANISH INDUSTRIAL PARTNER could assess its application with oilfield operators and industrial water-treatment companies in Egypt and the wider Middle East and North Africa region, followed by other markets where demand and regulatory conditions support its use.

Business value: a potential scalable commercial opportunity, subject to market validation and technical feasibility.



PROF. DR. REHAM ELSAYED HASSAN

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Functional Materials

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Current Position: Professor of inorganic chemistry,
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Hot Laboratory Center – Analytical Chemistry
Department

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Based in Egypt

ACADEMIC PROFILE

Professor of Inorganic Chemistry and researcher with 17 years of post-PhD academic and research experience, specializing in inorganic and functional materials chemistry, environmental remediation, radioactive waste management, selective separation, and analytical chemistry. My research integrates inorganic chemistry, polymer science, nanomaterials, analytical chemistry, and environmental applications to develop functional materials and separation technologies for toxic metals and radionuclides in complex aqueous systems.

My research trajectory has progressed from fundamental studies of polymeric, inorganic, and hybrid sorbents to practical separation and treatment concepts relevant to contaminated water, radioactive waste, and industrial environmental challenges.

I have also established an **international research collaboration with Fukushima University, Institute of Environmental Radioactivity (IER), Japan**, focusing on the joint development of advanced functional materials for the selective extraction of radioactive and toxic pollutants from water. The collaboration, entitled “Development of Climate-Resilient Silicate–Polyaniline Macrocyclic Hybrids for the Continuous-Flow Extraction of Radioactive and Toxic Pollutants,” aims to combine advanced materials synthesis and characterization with radiochemical evaluation and selective separation under complex environmental conditions. This collaboration strengthens the international and interdisciplinary dimension of my research and supports the translation of laboratory-based materials chemistry into continuous-flow environmental treatment technologies.

Building on this expertise, my current research interest is directed toward the development of practical technologies for NORM (Naturally Occurring Radioactive Materials) generated by the petroleum industry, particularly the treatment of NORM-contaminated produced water and associated waste streams and the potential recovery of valuable elements. My overarching research goal is to translate advanced inorganic and materials chemistry into scalable, sustainable, and industry-relevant solutions for water security, resource recovery, radioactive waste management, and environmental protection, **in alignment with Qatar University’s research priorities and Qatar National Vision 2030**, of NORM-contaminated produced water and associated waste streams, while exploring opportunities for the recovery of economically important elements.

Moreover, I have great **experience in teaching undergraduate** and advanced chemistry courses, training postgraduate and professional learners, supervising research, and developing sorbent and composite materials for the selective removal of radionuclides and toxic contaminants. Research experience combines materials synthesis and characterization with chromatographic and instrumental analysis, with a strong focus on environmentally relevant applications.

ACADEMIC QUALIFICATIONS

Ph.D. in Inorganic Chemistry, 2009, Zagazig University, Faculty of Science, Egypt

M.Sc. in Inorganic Chemistry, 2004, Benha University, Egypt

B.Sc. in Chemistry, 1997, Zagazig University, Benha Branch, Faculty of Science, Egypt

ACADEMIC PROGRESSION

Professor, Egyptian Atomic Energy Authority Analytical Chemistry Department, 2026–Present

Assistant Professor, Egyptian Atomic Energy Authority. 2019–2026

Lecturer, Egyptian Atomic Energy Authority, 2009–2019

Researcher, Egyptian Atomic Energy Authority, 2001–2009

TEACHING EXPERIENCE IN BOTH THEORY AND LABORATORY

Kuwait University, Faculty of Science (2010–2011): university-level teaching of chemistry **Theory** courses **92, 101, 105, 114** and **Laboratory** course **269**, with classes of approximately 40–50 students. Average teaching evaluation: 95%.

Egyptian Atomic Energy Training Center (2014–Present): lecturer for graduate-level specialized **Laboratory** courses in **Chromatography**, typically serving approximately 100–150 trainees. Courses for undergraduate-level learners, typically serving approximately 50–80 students.

Teaching areas: Inorganic Chemistry, General Chemistry, Analytical Chemistry, Environmental Chemistry, Laboratory Chemistry, Chromatography and Instrumental Analysis.

Technology Enhanced and Student Centered Teaching:

Implemented student centered and technology enhanced teaching approaches using digital learning platforms, online instruction through Zoom program, interactive presentations, screen based problem solving, digital scientific resources, and technology supported laboratory/data interpretation activities to enhance student engagement and independent learning.

Teaching profile includes: lecture-based instruction, laboratory-oriented analytical chemistry, practical interpretation of instrumental data, problem solving, and linking chemical principles to real environmental and industrial applications.

RESEARCH PROFILE

- Years of experience after PhD: **17 years**
- H-index: **11**
- Total citations: **418**
- Google scholar link: <https://scholar.google.com/citations?user=bjGI4VQAAAAJ>
- Scholar ID: **bjGI4VQAAAAJ**.
- ORCID: 0000-0001-5107-4040
- The number of publications in Q1 journals in the last 5 years: **3**
- The number of publications in Q2 journals in the last 5 years: **6**
- The number of publications in Q3 journals in the last 5 years: **1**
- The number of publications in Q4 journals in the last 5 years. **Non**
- The number of publications in non-indexed journals. **1**

SUPERVISION

One student, Ph.D. Supervision at 2019

Role: Principal supervisor

RESEARCH GRANT

- STDF grant ID 53229
- Title: Sustainable Environmental Recovery of Valuable Radioisotopes From Radioactive Waste Solution For Industrial and Medical Uses.
Role: First Researcher
Budget: EL 3,000,000
- Joint Egyptian Japanese Scientific Cooperation (JEJSC) grant (under review).
Role: Principle Investigator.
Budget: EL 1,500,000

INTERNATIONAL COLLABORATION

Fukushima University, Institute of Environmental Radioactivity (IER), Japan: international collaboration on advanced functional materials for selective extraction of radioactive and toxic pollutants from water, combining materials synthesis and characterization with radiochemical evaluation.

HONORS & AWARDS

- Best Research Award (2013), Egyptian Association for Nuclear Science and its Applications.

RESEARCH VISION ALLIGNED WITH QATAR UNIVERSITY RESEARCH EXPERTISE

1. **Inorganic and Functional Materials Chemistry:** Design, synthesis, and physicochemical characterization of advanced inorganic, polymeric, and organic-inorganic hybrid materials for environmental and technological applications.
2. **Advanced Materials for Environmental remediation:** Development of functional sorbents, nanocomposites, porous materials, and hybrid polymer-inorganic systems for the selective removal of toxic metals, radionuclides, and emerging contaminants from water and complex environmental matrices.
3. **Sustainable Water Treatment and Resource Protection:** Development of efficient, reusable, and environmentally responsible materials and separation technologies for wastewater treatment, water-quality protection, and sustainable management of water resources, supporting Qatar's priorities in water security and resource sustainability.
4. **Radioactive Waste Management and Environmental Protection:** Selective separation, immobilization, and remediation of radionuclides from radioactive and contaminated waste streams, with emphasis on safer and more sustainable treatment technologies.
5. **Selective Sorption and Separation Chemistry:** Investigation of adsorption mechanisms, selectivity, kinetics, thermodynamics, regeneration, and competitive sorption behavior of functional materials toward radionuclides and toxic metal ions under complex environmental conditions.
6. **Polymer-Inorganic Hybrid and Nanocomposite Materials:** Fabrication of multifunctional polymer-based, silica-based, zirconium-phosphate, graphene-containing, and macrocyclic ligand-functionalized materials with tailored surface chemistry and selective binding sites.
7. **Green Chemistry and Sustainable Materials:** Development of low-waste, reusable, and environmentally compatible materials and processes that minimize secondary waste and enhance the sustainability of environmental remediation technologies.
8. **Environmental Analytical Chemistry:** Application of spectroscopic, chromatographic, elemental, and radiochemical analytical techniques for the characterization of materials, environmental contaminants, and treatment performance.

9. Materials Characterization and Structure–Property Relationships: FTIR, XRD, TGA/DTA, SEM–EDX, ICP/AAS, UV–Vis, chromatography, and related techniques to establish relationships between material structure, surface functionality, and environmental performance.

10. Applied and Interdisciplinary Research: Integration of inorganic chemistry, materials science, analytical chemistry, environmental chemistry, and radioactive waste management to develop practical solutions to water pollution, hazardous waste, and resource-sustainability challenges.

11. Research Translation and Technology Development: Advancement of laboratory-scale materials and separation concepts toward scalable treatment systems through interdisciplinary collaboration, external research funding, industry engagement, and international partnerships.

PROFISSIONAL DEVELOPMENT ACTIVITIES AND SERVICES TO UNIVERSITY

At Qatar University, I would actively contribute to the professional development of students, researchers, and faculty through seminars, technical workshops, laboratory training, research mentoring, and interdisciplinary activities. I would particularly be interested in sharing my practical experience in GC, LC, HPLC, AAS, UV–Vis, ICP, and MCA/radiometric analysis, as well as my experience in environmental analysis, radioactive materials, laboratory safety, and quality assurance. I would also encourage students and young researchers to develop not only strong technical skills, but also scientific independence, critical thinking, responsible research practices, and effective scientific communication.

I would seek to build strong professional connections within Qatar University and with national and international universities, research institutions, governmental organizations, and industry. My international collaboration with Fukushima University's has strengthened my appreciation of the value of international scientific partnerships, and I hope to develop similar collaborations that create opportunities for joint research, student training, knowledge exchange, and externally funded projects.

THE NEXT 5 YEARS PLAN

1. THEME 1

Advanced Functional Materials for Water Treatment.

Research objective: Develop multifunctional inorganic and hybrid materials capable of removing contaminants from desalination-related streams, industrial wastewater, produced water, and treated wastewater under the high-salinity conditions relevant to Qatar.

Proposed first project: “Salt-Tolerant Hybrid Functional Materials for Selective Removal of Toxic Metals from Industrial and Produced Water.”

2. THEME 2

Selective Recovery of Toxic and Strategic Elements

Research objective: Develop selective inorganic and hybrid materials for the recovery of valuable or hazardous elements from complex aqueous systems.

Proposed project: “Selective Hybrid Sorbents for Recovery of Rare-Earth and Strategic Elements from Complex Industrial Waters.

3. THEME 3

Smart Environmental Monitoring and Sustainable Remediation

Research objective: Environmental monitoring

Proposed project: Functional Inorganic–Polymer Sensors for Rapid Monitoring of Toxic Contaminants in Qatar's Water Resources.

Advanced Functional Inorganic and Hybrid Materials for Sustainable Water Treatment, Environmental Remediation, and Strategic Resource Recovery in Qatar and Arid Regions.

SELECTED PEER-REVIEWED PUBLICATIONS

Authors	Publication Title	Journal	Year	Impact Factor	Q
A.El-Tantawy H.M.M. Abo Eldahab <u>Reham S. Hassan</u>	Sorption and separation of Zirconium and Yttrium by Poly acrylic acid (vinyl sulfonic acid - Co – Acrylonitrile) backed column.	Polymer Bulletin	2026	4.2	Q2
Sayed S.Metwally Emad H. Borai, Mostafa M. Hamed · <u>Reham S. Hassan</u>	Sorption behavior of selected fission products on spent alum sludge.	Radioanalytical and Nuclear Chemistry	2025	1.7	Q3
<u>Reham S. Hassan</u> , N.M. Sami , Mahmoud M.S. Ali , A.A. Elsayed	Adsorption performance of eco-friendly chitosan/ graphene oxide composite hydrogel for removal of ^{134}Cs and $^{152+154}\text{Eu}$ radionuclides from aqueous solution.	Applied Radiation and isotopes	2025	1.9	Q2
<u>Reham S. Hassan</u> , H. M. M. Abo Eldahab	Sonochemical synthesis of polymeric adsorbent based on biodegradable chitosan for the removal of some fission products.	Particulate Science and Technology	2025	1.5	
Amir Ezzat, Mamdoh R. Mahmoud, <u>Reham S. Hassan</u>	Adsorptive flotation of cesium radionuclides from aqueous solutions using rice straw agriculture.	Chemistry and Ecology	2024	3.2	Q2
MIA Abdel Maksoud, Mohamed Mohamady Ghobashy, Mohamed I Aly, <u>Reham S Hassan</u> , AH Ashour	Gamma radiation-induced synthesis of polyaniline/CuWO ₄ nanocomposite for potential sorption of cobalt-60 and cesium-137 from aqueous solutions	Applied Organometallic chemistry	2024	4.9	Q1
<u>Reham S. Hassan</u> , SE Rizk, MG Hamed	Synthesis of N-isopropyl acrylamide copolymerized acrylic acid capped with dibenzo-18-crown-6 composite for selective separation of Co-60 radioisotope from radioactive liquid	Polymer Bulletin	2023	4.2	Q2
<u>Reham Hassan</u> , HMM Abo Eldahab, FA Shehata, SA El-Reefy, SA Mohamed	Proficiency of some synthetic alginate derivatives for sequestration of Iodine-131 from radioactive liquid waste	Environmental Technology	2023	2.3	Q2
MIA Abdel Maksoud, Mohamed Mohamady Ghobashy, Mohamed I Aly, <u>Reham S Hassan</u> , AH Ashour	Gamma radiation-induced synthesis of polyaniline/CuWO ₄ nanocomposite for potential sorption of cobalt-60 and cesium-137 from aqueous solutions	Applied Organometallic chemistry	2024	4.9	Q1
<u>R.S.Hassana</u> , Mahmoud Goneam Hamed, Omayma Ghazyb and Emad Hassan Boraia.	Synthesis of Polymer-Magnetic Nanoparticle: effect of nano-filler on physicochemical properties, and Column applications for recovery of some radionuclides	Industrial & Engineering Chemistry Research	2022	4.3	Q1
<u>Reham S. Hassan</u> , MR Abass, MA, Eid, EA Abdel Galil	Sorption of some radionuclides from liquid waste solutions using anionic clay hydrotalcite sorbent	Applied Radiation and Isotopes	2021	1.9	Q2

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PhD certificate


Arabic Republic of Egypt
ZAGAZIG UNIVERSITY
FACULTY OF SCIENCE
Post Graduate Affairs


التكريم

CERTIFICATE

This to certify that Mr. **Reham Elsayed Hassan Abd-Elmonaim**

Nationality **Egyptian** Born in **Al-Esmalia** On **10/11/1975**

Has obtained Degree **Ph.D In Chemistry (Inorganic Chemistry)**

The Thesis Title is **" Chromatographic Separation and Subsequent Preliminary Production of Light Lanthanide Elements from Some Egyptian Minerals "**.

That was approved by the Faculty Council on **11/01/2009**

and the University Council on **26/01/2009**

Post Graduate Affairs **Somaya** Registrar **52** Dean **16**

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RECOMMENDATION LETTER 1



INSTITUTE OF
ENVIRONMENTAL
RADIOACTIVITY

環境放射能研究所
INSTITUTE OF ENVIRONMENTAL RADIOACTIVITY

To Whom It May Concern

I am a professor at the Institute of Environmental Radioactivity, Fukushima University, Japan. Prof. Hassan and I have prepared a joint Egypt–Japan research proposal. Although it remains under review and we have not co-authored a publication, this work has allowed me to assess her scientific judgment, professionalism, and ability to develop an international research program.

Prof. Hassan was diligent, responsive, and consistently engaged. She contributed to the scientific objectives, experimental design, work packages, allocation of responsibilities, and practical planning. She also helped in preparing a coherent project that draws on the complementary expertise of both teams.

Prof. Hassan is skilled at building international partnerships and coordinating work across institutions. Her expertise in waste management, functional materials for environmental applications, and analytical chemistry would add valuable interdisciplinary breadth to the department.

Prof. Hassan has the expertise, international experience, and commitment to applied research to contribute to Qatar University's Department of Chemistry and Earth Sciences. I am confident that she can build a productive research program and contribute to teaching, student supervision, and interdisciplinary collaboration.

I recommend Prof. Dr. Reham Elsayed Hassan for the position of Assistant Professor of Inorganic Chemistry at Qatar University without reservation. I would be pleased to provide further information upon request.

Sincerely,

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Professor

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