

Office of International Relations
Indian Institute of Technology
Kharagpur - 721 302

निदेशक कार्यालय
DIRECTOR'S OFFICE
सं. NO.: 3987
IN 13 SEP 2024
OUT 13.9.24
भा. प्रौ. सं. खड़गपुर
IIT KHARAGPUR

REF: 2334/2024/OIR

Dated: 13.09.2024

NOTE

Sub: Approval for the visit of Prof. G. Z. Ramon from Israel during 25th Sept – 10th Nov, 2024.

Prof. Guy Zeev Ramon from the Technion – Israel Institute of Technology is scheduled to visit IIT Kharagpur from September 25th to November 10th, 2024, for research collaboration as part of the ongoing SPARC project on electrochemical transport in ion exchange membrane electrolyzers for green hydrogen production.

The faculty coordinator for his visit is Dr. Sourav Mondal from the Department of Chemical Engineering (Flag-i). According to the submitted document, all expenses related to his visit will be covered by the SPARC project (Code: TIH). (Flag-ii).

The supporting documents of the visit are enclosed.

This is placed for your kind consideration and approval of the said visit.

Encl.Flag: (i) Filled-up Ministry Clearance Form
(ii) Filled-up Issuance of Visa Form
(iii) Copy of SPARC Sanction letter
(iv) Passport copy

Aman K. Ray
13.09.24
Junior IR- Executive

~~IR-Executive~~

13/09/24
'A' may be approved please.
R. Bhattacharya
13/09/2024

W Dean, International Relations

Director

(A) approved.

J
17/09/2024



INV. Reg /SL. NO - 389 / Entered by AR on 19.09.24

भारतीय प्रौद्योगिकी संस्थान, खड़गपुर
Indian Institute of Technology, Kharagpur

Prof. Rabibrata Mukherjee
Dean, International Relations
IIT Kharagpur, WB - 721302

INVITATION LETTER

Date: 18.09.2024

To:

Prof. Guy Zeev Ramon
6 Hashnaim St., Pardes Hana-Karkur
Israel.

Subject: Invitation to visit Indian Institute of Technology Kharagpur during 25th Sept -10th Nov 2024.

Dear Prof. Guy Zeev Ramon,

IIT Kharagpur is pleased to invite you for research collaboration as part of the ongoing SPARC project on electrochemical transport in ion exchange membrane electrolyzers for green hydrogen production from 25th Sept -10th Nov 2024.

We have noted your passport details as follows:

Name: Guy Zeev Ramon
Nationality: Israeli
Country of present domicile: Israel
Passport number: 24415449

Place of Issue of passport: Copenhagen
Issue date of passport: 27. 02. 2023
Expiry date of passport: 26. 02. 2028
Date of birth: 30th January 1976

We understand that all expenses related to your visit will be covered by SPARC project (Code: TIH). Dr. Sourav Mondal (smondal@che.iitkgp.ac.in) from the Department of Chemical Engineering at our institute will be the coordinator for your visit. We would be delighted if you could accept our invitation and kindly provide your travel plans to Dr. Mondal.

I look forward to your positive response. Please feel free to discuss any matters related to your visit with Dr. Mondal

With warm regards,

Sincerely,

Rabibrata Mukherjee - 18.09.2024
Dean, International Relations

दॉ. रविब्रत मुखार्जी
Dr. Rabibrata Mukherjee
संकायाध्यक्ष, अंतर्राष्ट्रीय संबंध
Dean, International Relation
भारतीय प्रौद्योगिकी संस्थान खड़गपुर
Indian Institute of Technology Kharagpur

CC:
(1) Office of Registrar, IIT Kharagpur
(2) Prof. B.C. Meikap, HoD-Chemical
(3) Dr. Sourav Mondal, Chemical



**Office of International Relations
Indian Institute of Technology
Kharagpur-721302**

**FORM FOR MINISTRY CLEARANCE
GOVERNMENT OF INDIA
FOR VISIT OF FOREIGN NATIONALS TO
INDIAN INSTITUTE OF TECHNOLOGY KHARAGPUR, INDIA**

1	Name :	Guy Ramon
2	Nationality :	Israel
3	Date of birth :	30.1.1976
4	Place of birth :	Sydney, Australia
5	Number, Date & Place of Issue of Passport :	24415449, 27.2.23, Copenhagen
6	Visa Number (if available)	
7	Current residential address :	6 Hashnaim st., Pardes Hana-Karkur
8	Permanent residential address :	6 Hashnaim st., Pardes Hana-Karkur
9.	Profession :	Professor of Engineering
10.	Place of Employment:	Technion – Israel Institute of Technology
11.	Academic Credentials:	PhD
12.	Purpose of visit:	Academic activity in research and teaching
13.	Period of visit:	25 Sep 2024 – 10 Nov 2024
14.	Email:	ramong@technion.ac.il
15.	Day time Phone:	+972-54-4560507
16.	Address of Indian Embassy where you will be applying for your visa:	HaYarkon St 140, Tel Aviv-Yafo, Israel
17.	Coordinator of your visit at IITKGP/Dept :	Dr Sourav Mondal, Assistant Professor, Department of Chemical Engineering, IIT Kharagpur (email: smondal@che.iitkgp.ac.in)

G. Ramon



**Office of International Relations
Indian Institute of Technology
Kharagpur-721302**

Request for issuance of visa invitation letter to foreign citizens

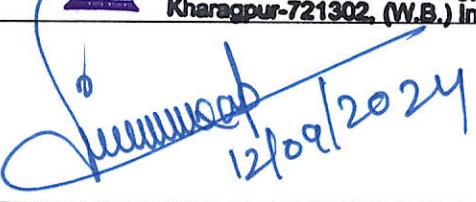
Invitee details

Name of the visitor:	Guy Ramon, Associate Professor
Address and contact details:	Room 624, Rabin Bldg, Technion Israel Institute of Technology, Technion city, Haifa, Israel (Phone: 972-4-8292580)
Citizenship:	Israel
Date of birth:	30/01/1976
Organization:	Technion Israel Institute of Technology

Details of visit

Host Dept/School/ Centre/ Office:	Chemical Engineering
Activity to be undertaken at IITKGP:	Collaborative research, Lectures, student supervision, workshop
Intended duration of stay at IITKGP :	25 Sep 2024 to 10 Nov 2024
Support provided by IITKGP (local travel, stay, food, honorarium, any other). Please give details of each type of support with funding source and proof:	Travel, accommodation and food, honorarium. This visit is part of the SPARC research collaboration visit. The funding support is provided from the SPARC research project grants [SRIC project side: TIH] All expenses related to the visit will be covered from the project grant and includes honorarium as per the SPARC scheme guidelines.
Support provided by any other organization incl. personal resources. Please give details and proof:	

Invited by

Name, affiliation and signature of host:	 Dr. Sourav Mondal Assistant Professor Chemical Engineering Department Indian Institute of Technology Kharagpur Kharagpur-721302, (W.B.) India
Recommended by Registrar/ HoD/ HoS/ HoC/ Dean (as appropriate)	

Please note: Govt. rules will be followed regarding issuance of visa invitation letters

विभागाध्यक्ष / HEAD
रसायनिक अभियानिकी विभाग
Chemical Engineering Dept.
भा. श्री हर कालपुर- 721302
IIT Kharagpur- 721302

विभागाध्यक्ष / HEAD
रसायनिक अभियानिकी विभाग
Chemical Engineering Dept.
भा. श्री हर कालपुर- 721302
IIT Kharagpur- 721302



No.:SPARC/2024-2025/ENSU/P3239

Date: 29/04/2024

To

Dr. Sourav Mondal
Chemical Engineering
Indian Institute of Technology
Kharagpur, Kharagpur, India - 721302

Project Theme: Energy Sustainability

Sub: Sanction letter of SPARC proposal

Dear Sir/Madam,

Based on the recommendation of the Apex Committee of SPARC, MoE has sanctioned the following project. The details are mentioned below:

Project Code : P3239
Proposal-Id : 3239
Title : [EEE] Electrochemical-transport in ion Exchange membrane Electrolyser for green hydrogen production

Indian PI : Dr. Sourav Mondal

Sanctioned Budget Details:

Budget head	No. of Visits/Workshops	Duration in months	Sanctioned Amount (in INR)
Travel – International Faculty*	2	2	4250000
Travel – International Scholar	-	-	0
Travel – Indian Scholar (at actuals, limited to @USD 2000 per trip)	2	6	340000
Out of pocket Expense – Indian Scholar Visiting Abroad (@USD 1000 per month)	-	-	1020000
Training Expenses			0
Publication / Monograph / Any Other Workshop / Symposium			300000
Contingency**	2		700000
Overhead			264400
Total			1057600
			7932000

The start date and the duration for the project are as follows:

Start Date : 01/04/2024 **Duration: 2 Years**

All procedures to be followed including expenditure will be as per SPARC norms.

No Change in PI/Co-PI (Indian/International) will be entertained.

As per rule 211 of GFR, the accounts of project shall be open for inspection by sanctioning authority / audit whenever the institute is called upon to do so.

The Institutes receiving grants under SPARC scheme should strictly adhere to the office memo no. F. No. 1(18)/PFMS/FCD/2021, dated 09/03/2022 issued by Ministry of Finance, Department of expenditure towards implementation of revised fund flow under Model-2 (details in Annexure I).

The Institute Coordinator of SPARC is requested to arrange for uploading provisional statement of accounts/UC in the site for all projects approved for the Institute during the 1st week of April and to upload the audited statement of accounts/UC by July.

Scheme for Promotion of Academic and Research Collaboration

A Government of India Initiative

Proposal-Id : 3239

Title of Project : [EEE] Electrochemical-transport in ion Exchange membrane Electrolyser for green hydrogen production

Submitted by : Dr. Sourav Mondal

Submitted on : 15-02-2024

Institute : Indian Institute of Technology Kharagpur

Theme : Energy, Sustainability and Climate Change

Abstract

With increasing demand for clean and sustainable energy sources, hydrogen has gained significant attention due to its high calorific value and zero carbon footprint. The green processes for hydrogen production using ion exchange membrane (IEM) aided electrolysis have been proven to be a sustainable alternative, but considerable R&D is needed to understand the transport mechanisms within the system for efficient, optimised and cost-effective operation.

The project aims to analyze the complex interplay between various transport phenomena, including ionic migration, water transport, and gas diffusion, within the IEM electrolyser. The fundamental understanding of these phenomena is crucial for optimizing the performance and durability of the electrolyser device. The study will focus on investigating the influence of various operational parameters on the electrochemical-transport behaviour of the IEM electrolyser. Parameters such as electrolyte concentration, current density, temperature, and membrane thickness will be systematically varied to assess their impact on hydrogen production efficiency. Efforts will be made to develop models and simulations that can accurately predict the electrochemical-transport behaviour of the IEM electrolyser. The insights gained from the experimental and computational analyses will be used to propose design modifications and operating strategies that can enhance the performance and longevity of the electrolyser for large-scale green hydrogen production.

Ultimately, this research project aims to contribute to the development of efficient, cost-effective, and environment friendly electrolysis systems, which can play a crucial role in the transition from fossil-fuel based energy system to a more sustainable energy future.

Keywords

Green hydrogen, proton exchange membrane fuel cell, anion exchange membrane fuel cell, ion transport, energy production

Name of Indian PI : Dr. Sourav Mondal

Home Institute : Indian Institute of Technology Kharagpur

Department : Chemical Engineering

Phone : 9547494036

Email Address : smondal@che.iitkgp.ac.in

Nationality : Indian

Passport # : Z5244990

Name of Indian co-PI : Prof. Sirshendu De

Home Institute : Indian Institute of Technology Kharagpur

Department : Chemical Engineering

Phone : 913222283926

Email Address : sde@che.iitkgp.ac.in

Nationality : Indian

Name of Indian co-PI : Dr. Raka Mondal

Home Institute : Indian Institute of Petroleum and Energy

Department : Chemical Engineering

Phone : 9932631600

Email Address : rakam.che@iipe.ac.in

Nationality : Indian

Name of International PI : Prof. Guy Ramon
Country : Israel
Institute : TECHNION - ISRAEL INSTITUTE OF TECHNOLOGY
Department : Civil and Environmental Engineering
Email Address : ramong@technion.ac.il
Phone : +972-4-8292580
Nationality : Israeli

Name of International co-PI : Prof. Viatcheslav Slava Freger
Country : Israel
Institute : TECHNION - ISRAEL INSTITUTE OF TECHNOLOGY
Department : Chemical Engineering
Email Address : vfreger@technion.ac.il
Phone : +972-73-378-2933
Nationality : Israeli

Objectives :

Mathematical modelling of the transport phenomena involved in the electrochemical processes of green hydrogen production in ion exchange membrane based electrolyser.

Development of a standalone application tool for the simulation of ion-exchange electrolyser performance and energy calculations.

Understanding the challenges in quantifying the ion transfer through the charged membranes (both proton and anion exchange membrane types).

Technology assessment. Computation of the process efficiency, energy audit, process intensification and optimisation for units up to 1 MW scale.

Background and Motivation :

Hydrogen is a versatile, clean energy carrier, usable in various sectors, including transportation, industry, power generation. Proton and anion exchange membrane (PEM and AEM) based electrolysis have emerged as promising technologies for green hydrogen production due to their efficiency and environmental benefits. One key advantage of this technology is their portability and high energy efficiency (~35 kW/kg) compared to traditional electrolysis methods (solid-oxide-cells ~3kW/kg). This is achieved by reducing Ohmic losses, minimizing energy requirement, and increasing the output of hydrogen. They can achieve higher current densities at lower temperatures (<100C), resulting in overall better performance.

Additionally, PEM and AEM electrolysis offer greater flexibility in system design and scalability. Their compact size and low weight allow for easy integration into various setups, including decentralized and off-grid applications. This is especially important for the renewable energy systems, as hydrogen can serve as a vital storage and backup solution during periods of absence of its energy sources. Furthermore, these electrolyzers can utilise renewable electricity sources from solar, wind, or hydro sources for hydrogen production, contributing to reduction in greenhouse gas emissions and reliance on fossil fuels.

By advancing the efficiency and scalability of PEM and AEM electrolysis, researchers aim to accelerate the transition to a sustainable future. However, for its widespread application, the state-of-the art solutions need improvement in energy-utilisation efficiency through design and operational optimisation and strategic choice of cell materials. All these issues can be strategically answered through the planned actions presented in this proposal.

Research Plan :

