Global Young Academy

Young Scientist Ambassador Programme

Country of Origin:
India

Country of destination:
Israel

Time of Visit:
24-29 June 2019

Ambassador:

Mahesh Kumar

Mission Report

YSAP Activities Overview:

(i) Initiating a cooperation between the Israel Young Academy and the Indian National Young Academy of Science

(ii) To start a research collaboration on Semiconductor Materials and devices between IIT Jodhpur and Israel Universities (Hebrew University & Bar-Ilan University)

(iii) Introducing the Global Young Academy (GYA) and its mission, including the Young Scientist Ambassador Programme (YSAP)

(iv) Discussion with EC members of the Israel Young Academy about YSAP and the GYA

(v) Encouraging students to be involved in science to solve community and global issues

Background

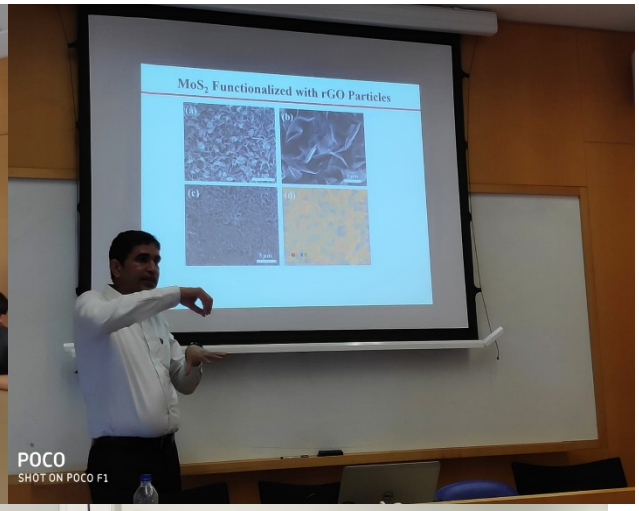
Major current environmental issues may include climate change, pollution, environmental degradation, and resource depletion. Air quality has degraded worldwide, particularly in developing countries, and poses threats to the survival of humans. Detection of NO_2 is a very interesting research topic in industrial and academia communities for various applications. After the discovery of graphene in 2004, this low dimensional material can play a vital role in gas sensor technology due to its remarkable properties. The high surface to volume ratio of graphene provides more reactive sites for interacting with electronics and gas molecules. Transferring the charge from grapheme into other materials depends on the nature of gas (oxidizing gas takes the electrons and reducing gas gives the electron). For the first time in 2007, graphene was used to explore the gas sensing behaviour of 2D materials. A change in resistance of graphene was observed through variation in charge density after adsorption of gas molecules. Graphene can detect single gas molecules of NO_2 because of the high mobility and low noise. However, it responds to other gases such as NH_3, H_2O and CO_2 which limits the use of graphene. In recent years, MoS_2, one of the most important members of metal dichalcogenides has received attention in gas sensor technology due to its highly selective nature towards NO_2. A significant number of published reports on NO_2 gas sensors based on MoS_2 show the growth in this domain internationally. I am working on new energy efficient sensors for environment monitoring. Israel has the potential to fabricate energy efficient low cost and fast sensors that can be deployed in vehicles to monitor air pollution.

YSAP activity at Bar-Ilan University on 25th June 2019

Dr. Kumar visited The Alexander Kofkin Faculty of Engineering department of Bar-Ilan University. Students demonstrated impressive research work on fiber-optics and integrated photonic devices. The devices were fabricated on Silicon substrate using E-beam lithography. He interacted with four faculty and 20 students from the department. During the meeting Dr. Kumar made a presentation on the topic of Photo-activated MoS_2 based ultrafast and reversible NO_2 sensors. After the presentation, students asked questions related to the topic and GYA activities. Dr. Mahesh Kumar wholeheartedly invited scientists to apply for the GYA Membership and participate in the activities. Prof. Michael Rosenbluh, Head of Physics department showed the facilities and discussed the collaboration under various bi-lateral schemes. He interacted with around 10 students of Physics department. Dr. Kumar's research interest is on Nano/Micro electronics devices. He visited the nano fabrication center and interacted with around 20 students and research staff. The head of the center explained about the facilities and ongoing research projects. Bar-Ilan University is the first university that has a museum of nanoscience and arts. Nano concepts are demonstrated using art, which allows the public to interface with science in a more general way.

Dr. Mahesh Kumar also had a discussion with Prof. Avinoam Zadok, Executive Member of the Israel Young Academy. Both academies are willing to work together on the UN Sustainable Development Goals and Dr. Kumar invited IYA EC members to attend the GYA AGM 2020, which will be held in India.


POCO
SHOT ON POCO F1


MoS_2 Functionalized with rGO Particles
(a)
(b)
(c)
(d)
POCO
SHOT ON POCO F1

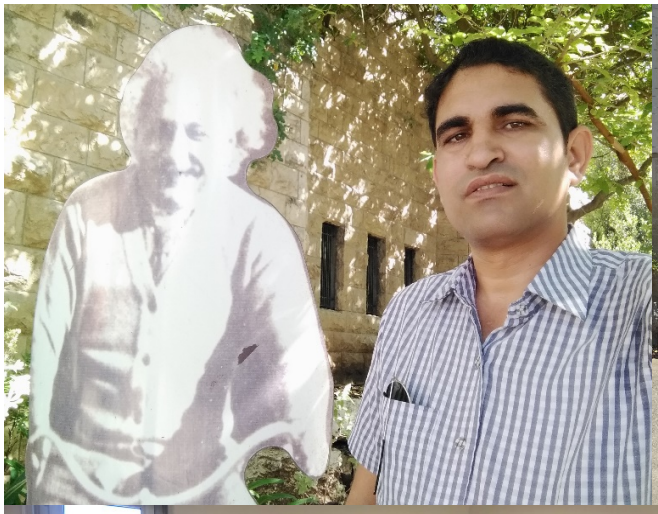

Bar-Ilan University
Newsletter
Forms
Gallery
IT Services
The Alexander Kofkin Faculty of Engineering
About us | Students | Graduate Programs | Faculty | Positions | Library | Alumni | News | Success stories
Contact Us
Study Programs
Bioengineering
Courses
Study program B.Sc - Electrical Engineering
Study program B.Sc - Computer Engineering
Photo-activated MoS2 based ultrafast and reversible NO2 Sensors
Date:
25/06/2019 - 15:00 - 16:00
Abstract:
Prof. Mahesh Kumar, Department of Electrical Engineering, Indian Institute of Technology Jodhpur, Jodhpur-342037, India
Continued growth of industrialization has led to the emission of various toxic and combustible gases. Among them, NO2 is one of the most poisonous gases which are mainly produced by the exhaust of automobiles and power plants. Exposure to even low concentration of NO2 results in several skin and respiratory diseases, so highly selective and sensitive gas sensors are required to detect the presence of ppm level of NO2. The emerged two-dimensional (2D) materials have gained considerable attention in chemical sensing owing to its naturally high surface-to-volume ratio. However, the poor response time and incomplete recovery at room temperature remain a challenge to develop high-performance practical gas sensor. Herein, we demonstrate


BIN
Nano Fabrication
POCO
SHOT ON POCO F1


אזור
מדעי הטבע
ננוטכנולוגיה
NANO
The Fetter Museum
of Nanoscience & Art
POCO
SHOT ON POCO F1

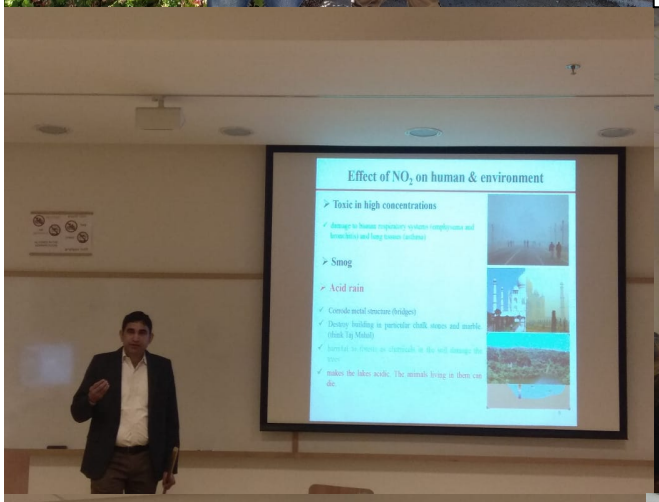
YSAP activity at School of Social Work and Social Welfare, The Hebrew University Jerusalem on 26th June 2019

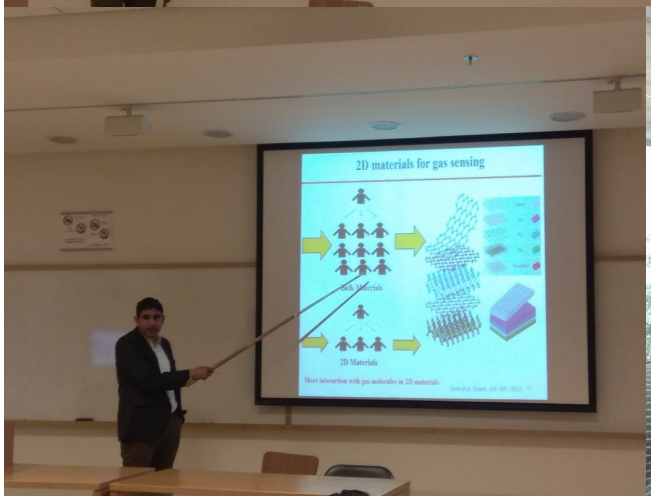
Dr. Kumar visited the School of Social work of The Hebrew University. The University is constructed of white stone, which gives it an awesome look. Prof. Einstein's statue reminds all of the link between the university and quantum physics. Dr. Mahesh Kumar discussed with the Dean Prof. Mona Khoury-Kassabri, GYA Member and seven faculty about GYA activities and collaboration opportunities between India and Israel.



Dr. Kumar met with the Head of International cooperation and discussed about ongoing collaboration and future possibilities of exchange of students and faculties between India and Israel.

YSAP activity at Center for Nanoscience and Nanotechnology, The Hebrew University of Jerusalem on 27th June 2019





After the discovery of graphene in 2004, the low dimensional materials play a vital role in addressing the problems of our daily life. The properties of these low dimensional materials can precisely be controlled due to the quantum confinement effect. The major challenge of low dimension devices is fabrication and characterization. Dr. Kumar visited and observed modern equipment at the Center for Nanoscience and Nanotechnology of the Hebrew University. He interacted with Solar Energy Group and observed new methods to improve solar efficiency. He had an in depth discussion with around 10 students on Clean Energy which is one of the SDGs. Dr. Kumar delivered a talk on the growth of verticality aligned MoS_2 flakes for fast and reversible NO_2 sensor. He also discussed about the GYA's mission and opportunities. He interacted with five professors and around 25 young researches. Dr. Kumar met Prof. Roie Yerushalmi, GYA Alumni and had discussion on GYA's past and present activities.

Visit to Jerusalem City on 28th June 2019

Agriculture is a highly developed industry in the Israel. Dr. Kumar is also working on water and humidity sensors. Israeli water irrigation technology is really impressive. Sensors deployed on the landscape are used to optimize use of water and fertilizers. The Old Jerusalem architecture and water supply systems are remarkable. Rain-water storage systems are deployed and the water supply system is based on gravity.

YSAP Follow-up:

Mahesh Kumar (India) will start research collaboration with Prof. Yossi Paltiel (The Hebrew University) and Prof. Michael Rosenbluh (Bar-Ilan University) on 2D materials and Devices. We also discussed to submit project proposals for international funding for collaborative research.

GYA member Mahesh Kumar
6th July 2019