



# SESAME

short status report at the 2<sup>nd</sup> LEAPS meeting

# SESAME stands for Synchrotron-light for Science and Applications in the Middle East

SESAME is located in Allan (Jordanien)

International Cooperation  
as example of peaceful  
collaboration



SESAME is the first Synchrotron Light Source in the Middle East

10 February 2016: start installation of the Synchrotron

16 May 2017: official Inauguration

17 Juli 2018: start of the  
research program



SESAME  
from Dream (1995) to Reality (2017)

SESAME is the  
first Associate of  
LEAPS

# SCHEMATIC OVERVIEW OF SESAME

**SAXS/WAXS**  
Small Angle and Wide Angle X-ray Scattering Beamline

Soft X-ray Beamline, HESEB

Tomography Beamline, BEATS

MS - Materials Science Beamline

**XAFS/XRF - X-ray Absorption Fine Structure / X-ray Fluorescence Spectroscopy Beamline**

**MX - Macromolecular Crystallography Beamline**

**Two experimental zones operational since July 2018**

**Booster synchrotron:**  
accelerates the electrons and

**Storage ring:**  
stores an electron beam. The beam circulates for many hours.

**focusing**  
characteristics of the beam.

**Beamlines:**  
collect the synchrotron light and convey it to experimental chambers. Beamlines operate in parallel, simultaneously serving tens of user groups.

**SESAME storage ring parameters**

Energy (GeV)	2.5
Current (mA)	200
Circumference (m)	133.2
Natural emittance (nmrad)	26

**Radiofrequency cavities:**  
restore energy lost by the circulating electrons as they emit synchrotron light.

**Bending magnets:**  
deviate the electron beam, keeping it inside the storage ring's doughnut-shaped vacuum chamber.

**operational**

**IR - Infrared Beamline**

Synchrotron light is emitted by the circulating electrons as their trajectories are deflected. It can be used to carry out research in fields ranging from medicine and biology, through materials science, physics and chemistry to healthcare, the environment and archaeology.

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Two experimental zones operational since July 2018

Five more will follow in the next years

operational

construction

design



**Since July 2018:** 39 Experiments executed by  
31 Groups from  
9 countries

### Emrah Özensoy, Turkey

"The high-quality X-ray beams at SESAME were of paramount importance for us, allowing us to elucidate the molecular level origins of the catalytic activity and stability of novel nanomaterials that can convert an atmospheric waste, CO<sub>2</sub>, and a biomass waste, glycerol, into the industrially valuable products CO and H<sub>2</sub> (i.e. syngas). We are thrilled that these experiments led to the very first peer-reviewed paper of SESAME. It is a great opportunity to have such a high-calibre facility in the region."



Bilkent University



National Research Center  
(Egypt)

### Gehan AHMED

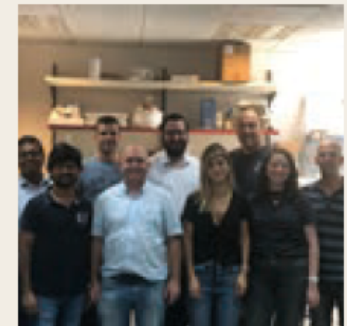
"Dramatic changes in the brain's biochemical composition are associated with Alzheimer's disease (AD) which gradually leads to memory loss and brain damage. In our research, we induced Alzheimer's disease in a rat model and monitored the effect of a specific medicinal plant water extract in treating the brain tissues. The measurement was done using the synchrotron FTIR microscopy provided by SESAME which was able to detect, with high accuracy, detailed structural information from very small biological materials with much higher resolution than a conventional FTIR."

**June 2019:** First Publication in peer reviewed journal

**October 2019:**  
More Experiments  
executed,  
accelerator performance  
very good

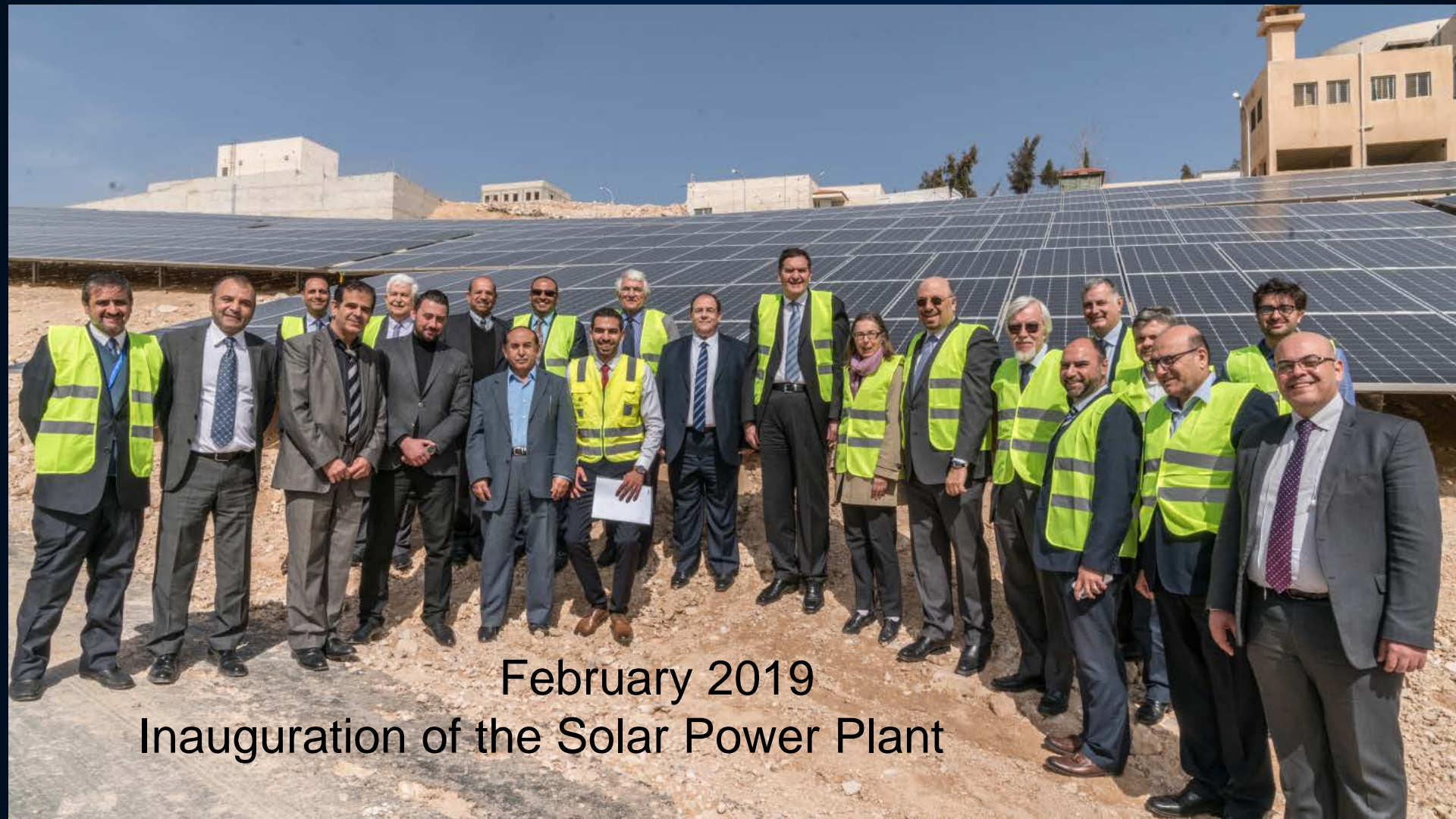
### Brian A. ROSEN

"Fuel cells are devices which can convert chemical energy into electrical energy with the aid of electrodes made from catalytic materials. Degradation of these materials negatively impacts the performance of the cell and limits its lifetime. The Rosen group is developing new catalytic materials for fuel cells based on transition metal carbides with enhanced stability and activity. X-ray adsorption techniques at SESAME assist us to learning the electronic configuration of these materials to reveal the origin of their improved performance."



Department of Materials  
Science and Engineering,  
Tel Aviv University (Israel)

SESAME is the only accelerator lab worldwide, that's entirely powered by solar energy



February 2019

Inauguration of the Solar Power Plant

# Main Issues

Funding

Personnel