

Communication across Borders

27-29 Nov 2024

CUBE in Morges, Switzerland

#PAERI24

PAERI24.EU



PAERI'24
Public Awareness and Engagement
with Research Infrastructures

hosted by



in partnership with



Gihan Kamel

SESAME Light Source

BM02-IR Beamline Principal Scientist

On Leave from: Department of Physics,
Faculty of Science, Helwan Uni., Cairo, Egypt



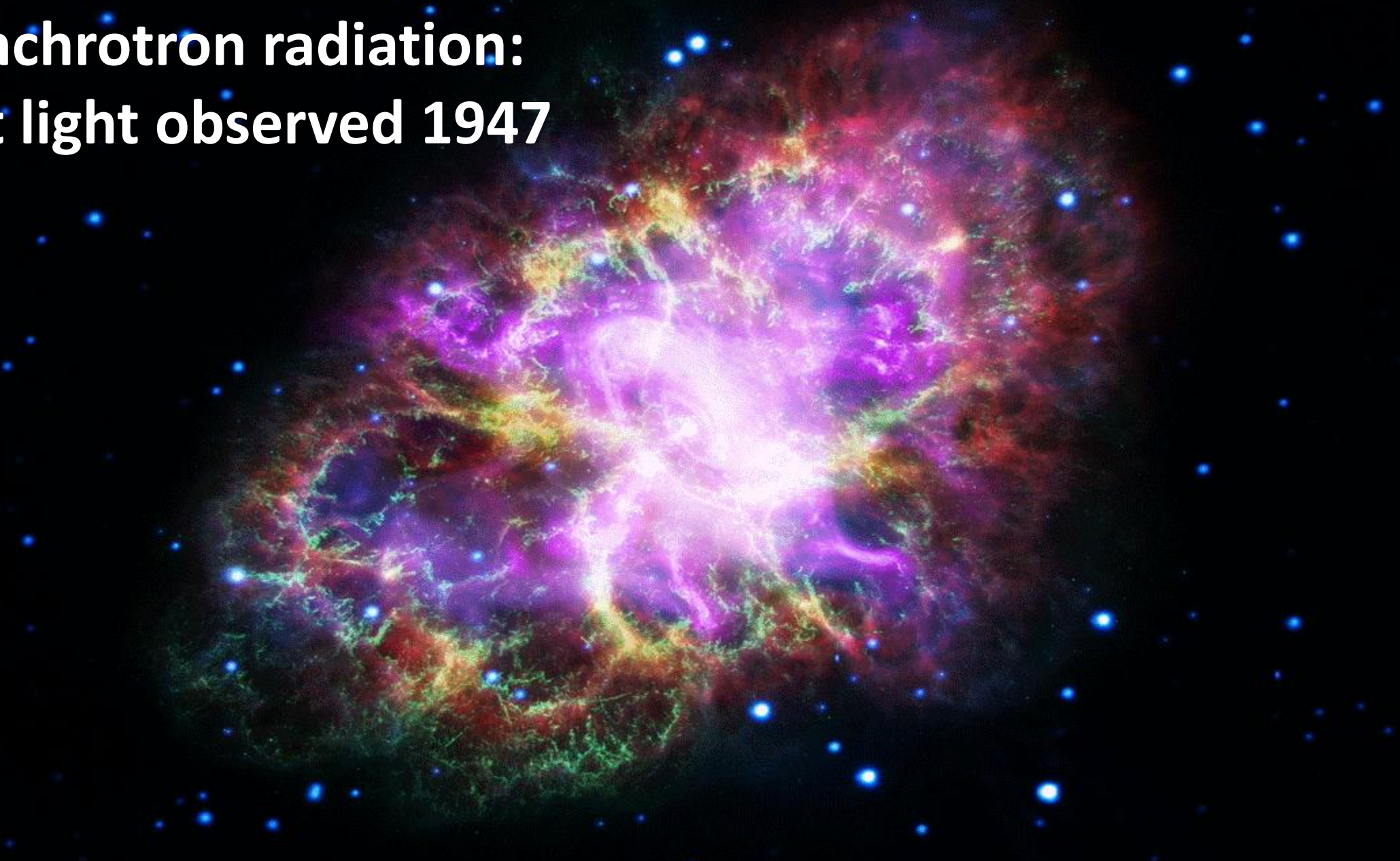
Perspective Matters..



SESAME: Synchrotron light for Experimental Science and Applications in the Middle East

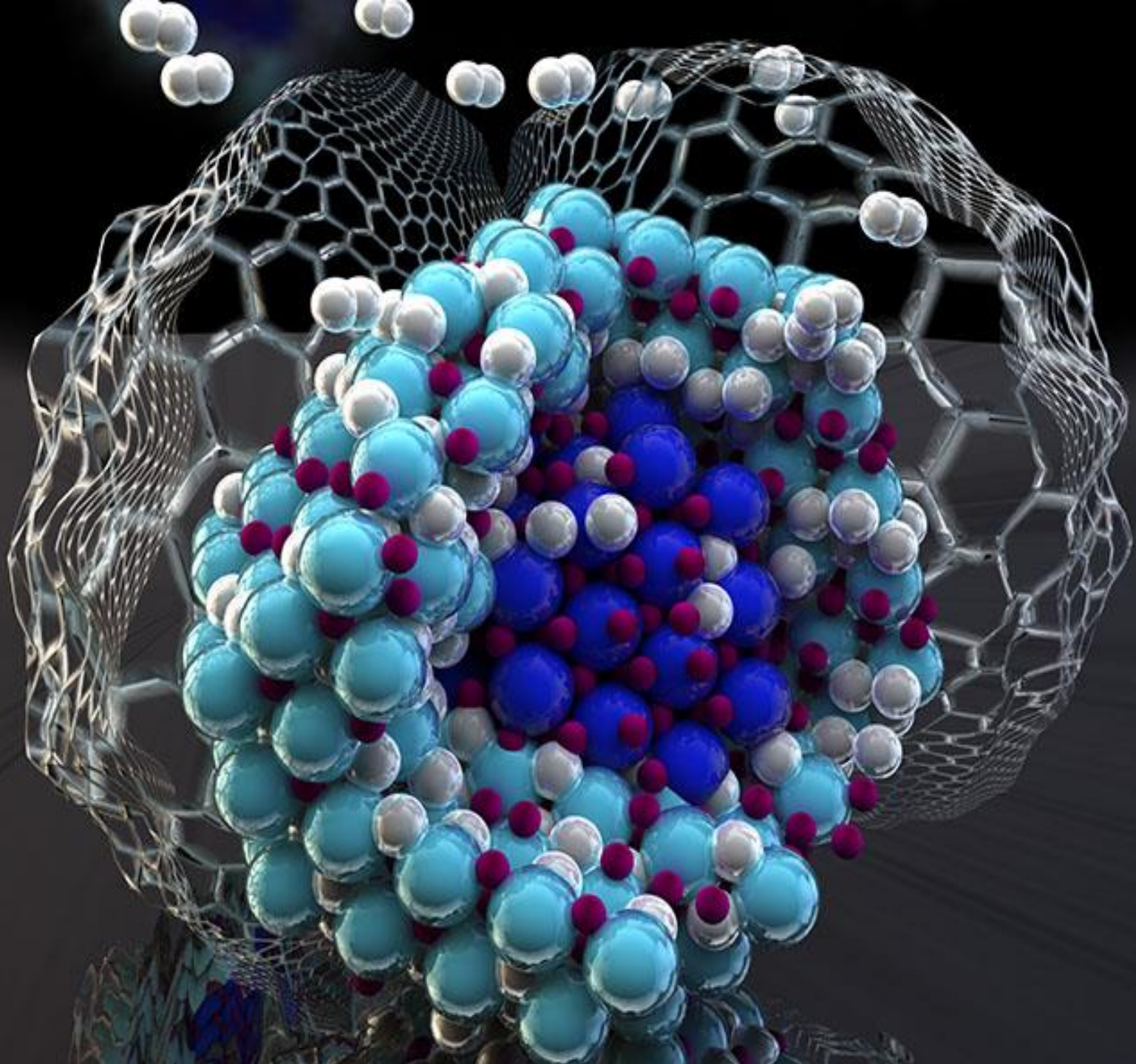


Synchrotron radiation: First light observed 1947

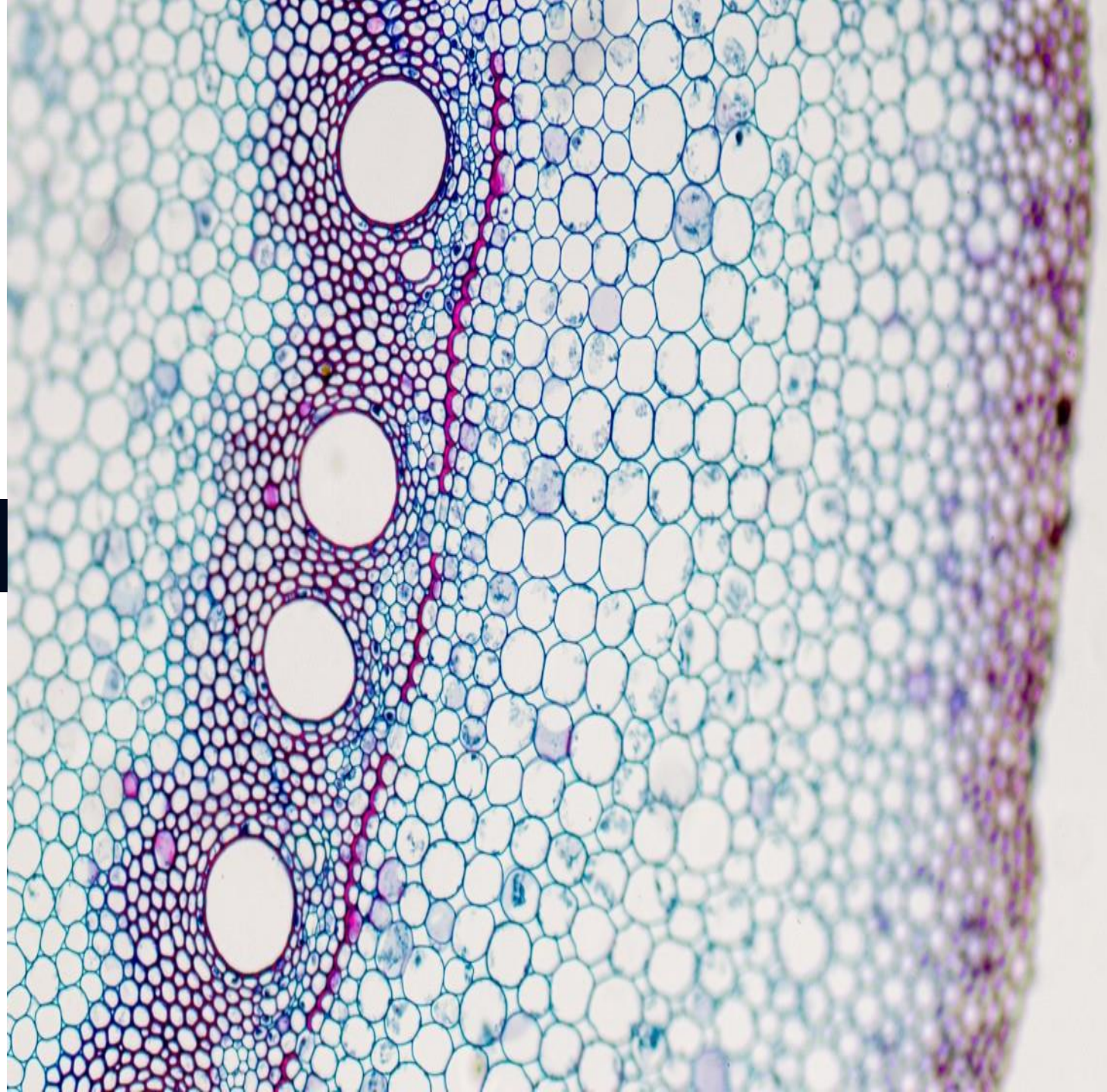


Crab Nebula: 6000 light years away! First light observed 1054 AD

Chemistry

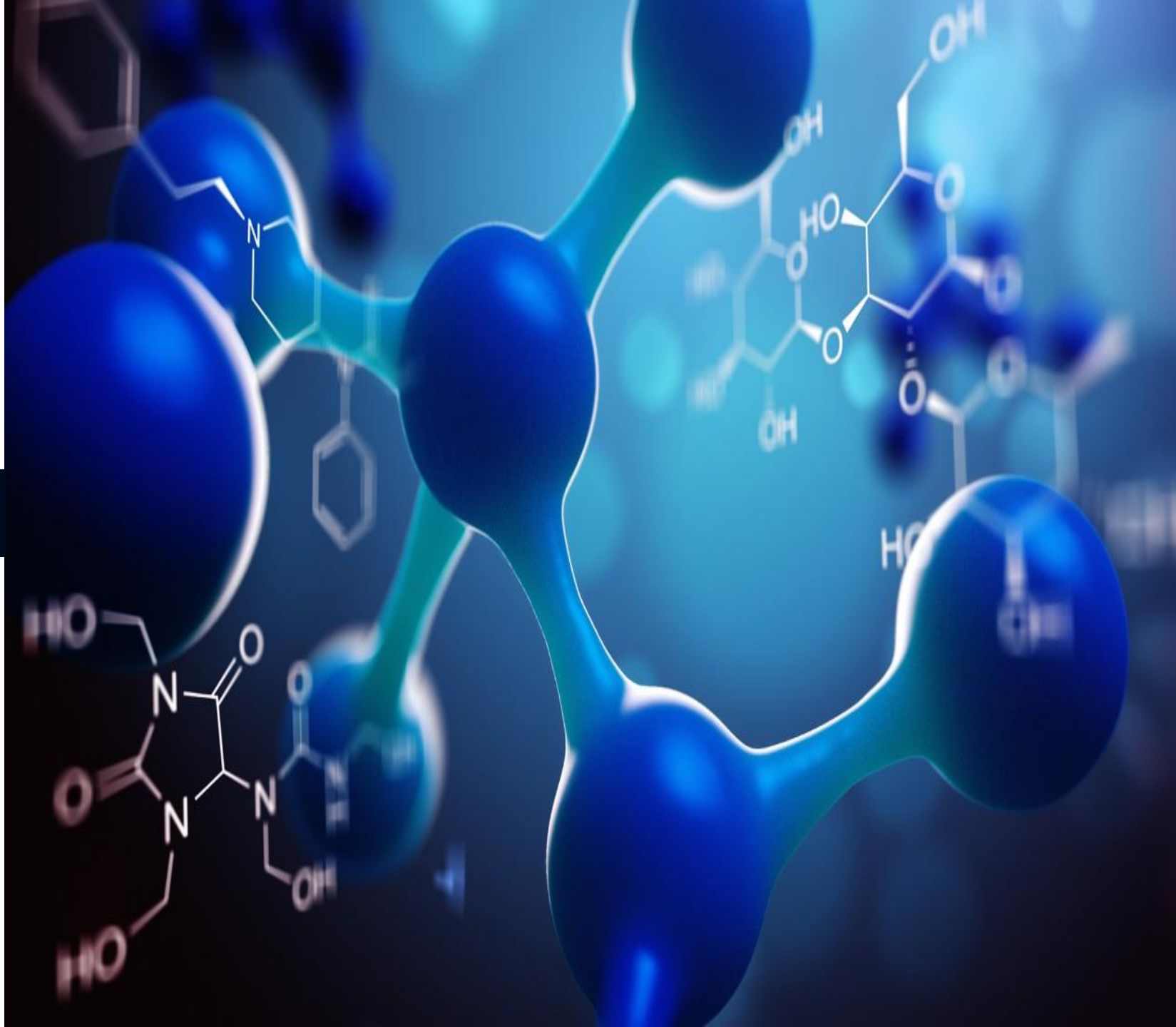


Biology





Materials Science



Energy



Microelectronics

PCB FAILURE ANALYSIS

—
TROUBLESHOOTING ELECTRONICS BY μ -FTIR



Pharmaceutical

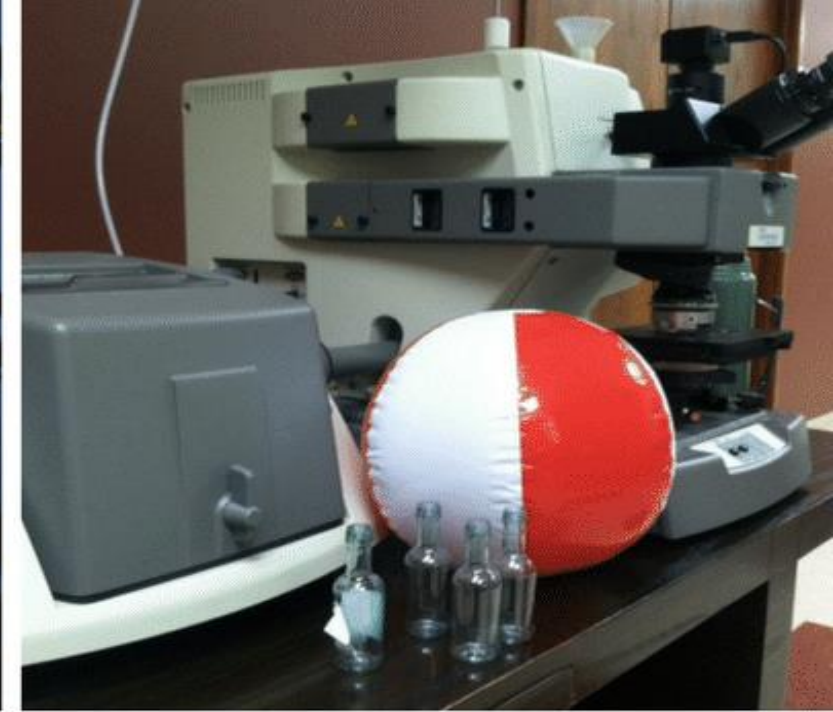


Environment



Forensics





Industry





On A Hot Trace with Infrared

IR sensors can protect from
the unconscious spread of
the coronavirus.

Medicine

Quality Control



Textiles



Cultural heritage And Archaeology



Palaeontology



Forgery Detection

Something to Scream About

How spectroscopy helped
preserve one of the world's
most famous paintings



Art Restoration

COPY CAT CONCRETE

How FTIR helps in the
recreation of ancient
building materials



SESAME: a long journey from conception to reality

BESSY I



SESAME 2002



SESAME 2024



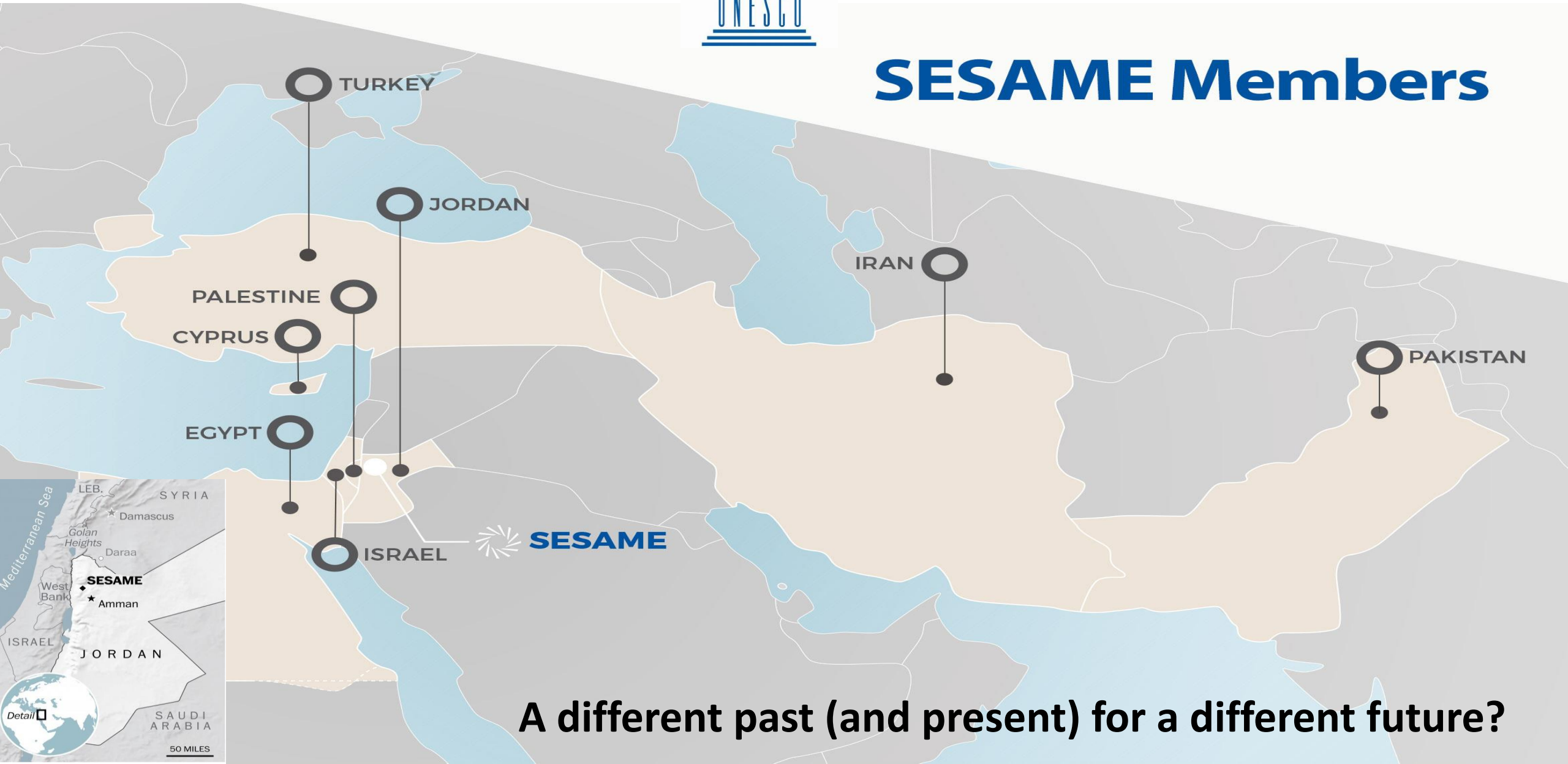


Modelled on CERN

Intergovernmental Organization at the service of its Members and the whole world



SESAME Members



A different past (and present) for a different future?

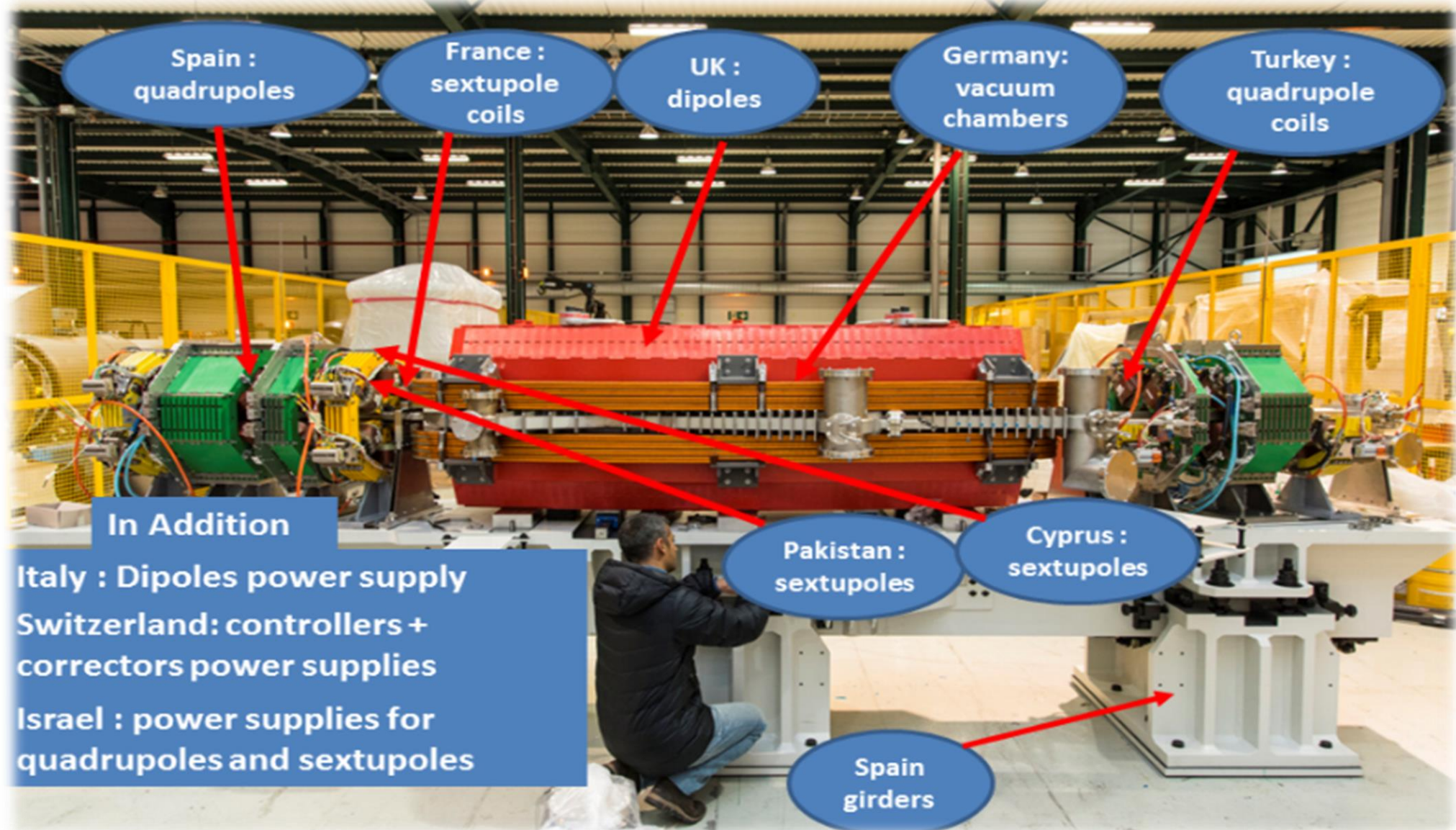
SESAME Observers



Brazil, Canada, China, the European Organization for Nuclear Research (CERN), the European Union (EU), France, Germany, Greece, Italy, Japan, Kuwait, Portugal, the Russian Federation, Spain, Sweden, Switzerland, UAE, UK and the USA. (UNESCO may serve on the SESAME Council).

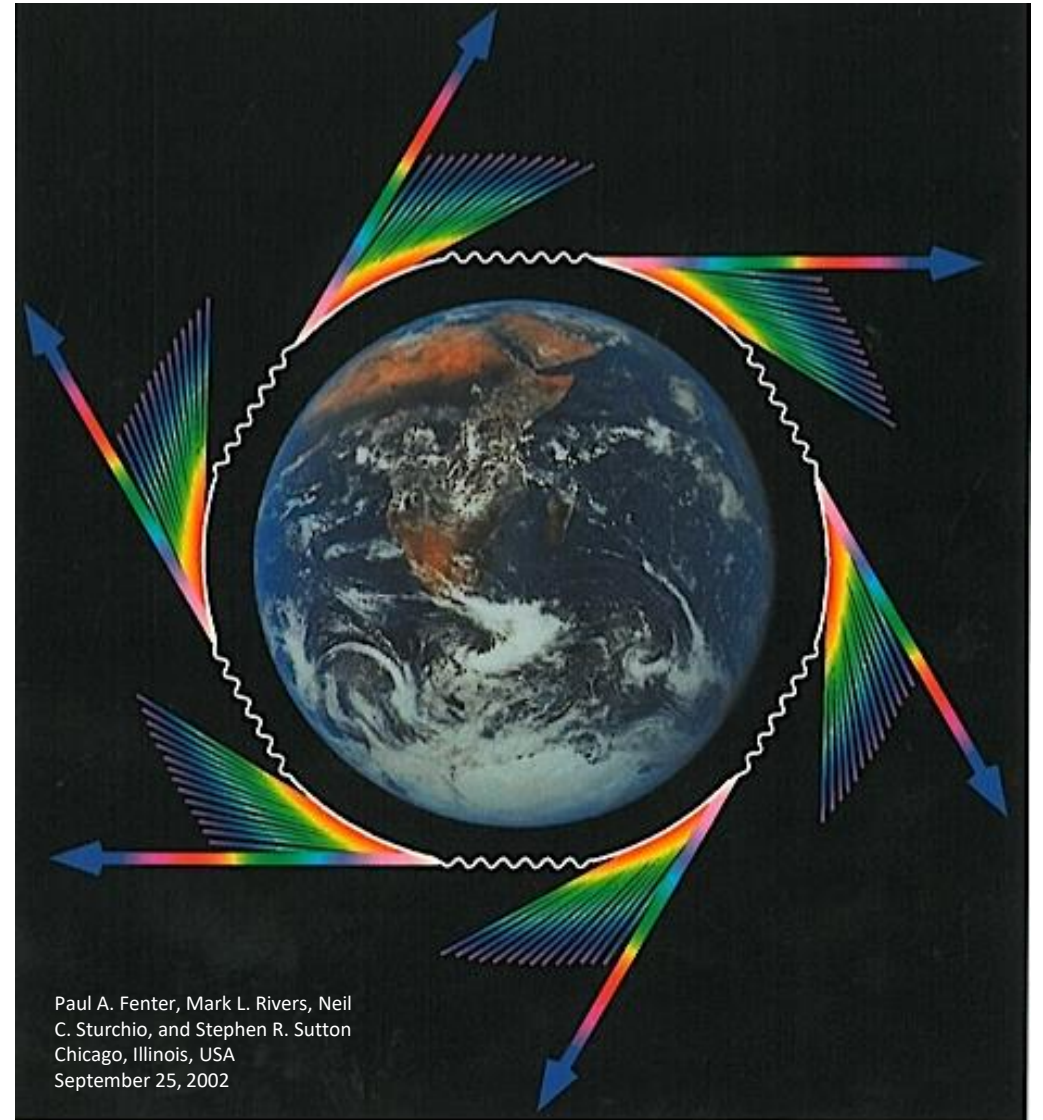
SESAME and International Cooperation.. a non ending story..

Science Diplomacy in Action..

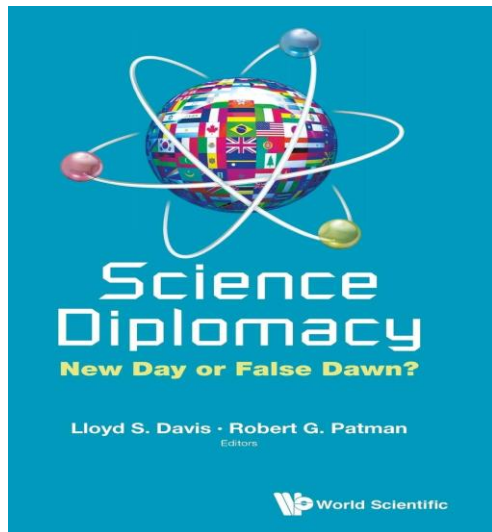
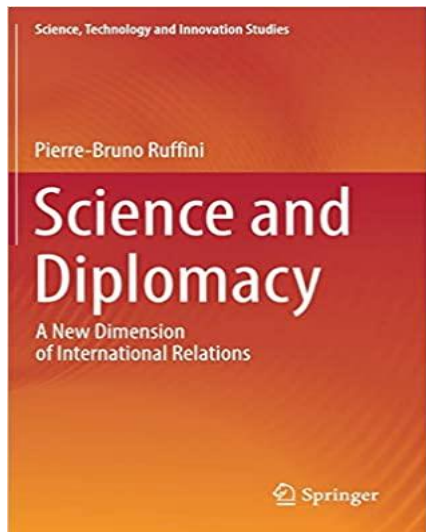
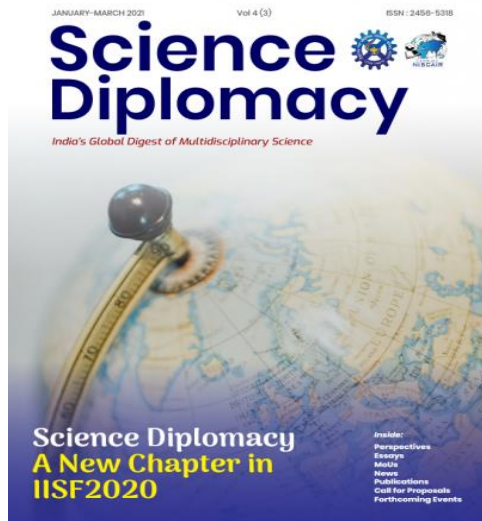
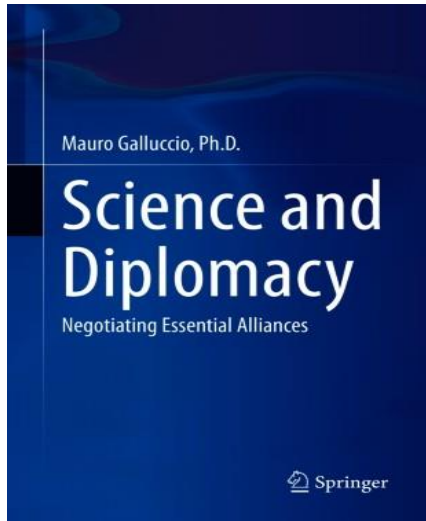


“Regionally-shared problems can best, or only, be solved through cross-border collaboration. The similarities of culture and experience, coupled with a common language and history of scientific achievement make collaboration an obvious strategy.”

Not enough..



Lesson: Successful Bridge Building Through Scientific Collaboration



CERN (1954):

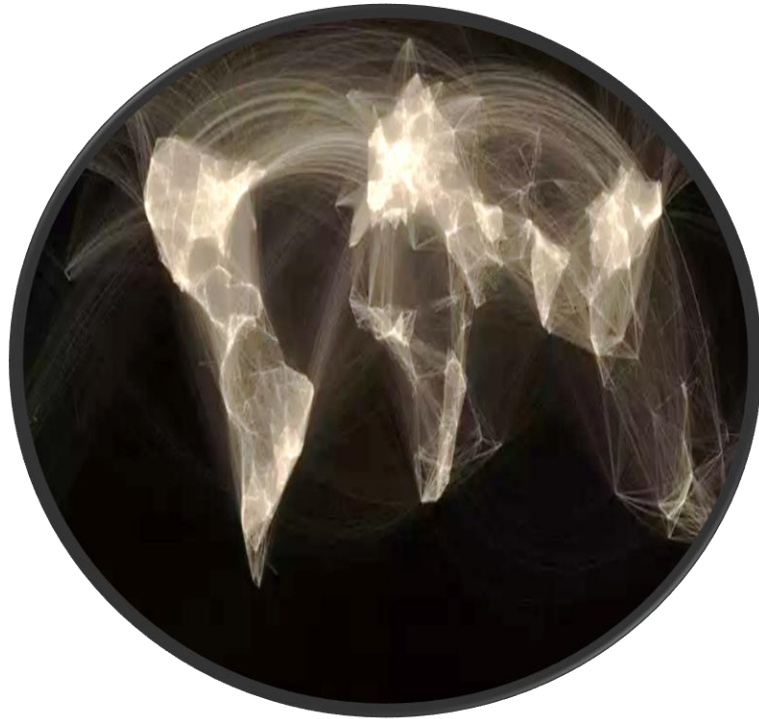
- **Physicists:** no European country could alone construct large accelerators → collaborating necessary for participation...
- **Diplomats and scientific administrators:** Joint European Laboratory → contributing to rebuilding bridges between nations were recently at war...

“Diplomatic Science does not work. Excellent science must be a major driving force, and is a necessary condition for building sound bridges..”

Science + Diplomacy?

“ “Impossible” is not a scientific term”

$$1 + 1 = 2$$



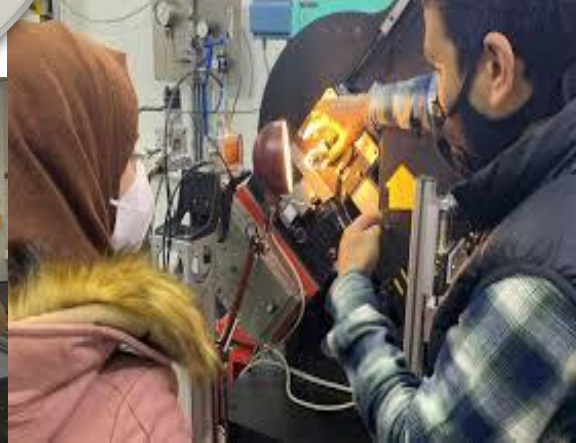
Map of international scientific collaboration 2008-2012,
Image: Olivier Beauchesne



Plataforma Media



If you want to walk fast, walk alone, If you want to walk far, walk together.



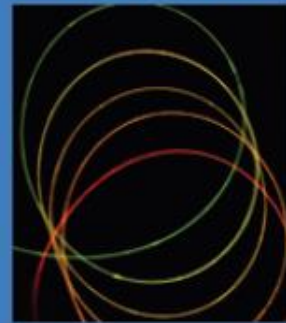
CHANGE YOUR FREQUENCY

 PANACHE DESAI



Scientists from every culture have contributed to light science

Science



Technology



Nature



Culture



← Sustainability & Development, Education, History, Young People →

2003 – 2024



The banner features the SESAME logo on the left, which consists of a stylized sunburst or fan shape. The text 'SESAME MILESTONES' is positioned below the logo. The timeline is presented in two rows of cards, each with a photograph and a brief description of an event. The cards are connected by a network of glowing blue lines, suggesting a complex and interconnected project. The background of the banner is dark blue with a subtle pattern of light blue lines.

Year	Event
2003	Ground Breaking
2003	Construction of SESAME building starts
2004	SESAME formally comes into existence
2008	Soft Inauguration
2012	Microtron Commissioning
2014	Booster Commissioning
2016	Storage Ring Commissioning
2017	Official Opening of SESAME
2017	First Light at XAFS/XRF Beamline
2018	IR and XAFS/XRF Beamlines open to users
2019	Solar Power Plant comes into operation
2019	Sergio Fubini Guesthouse is inaugurated
2020	MS Beamline opens to users
2024	HESEB Beamline opens to users
2024	BEATS Beamline opens to users

**International
Collaboration**

**Support &
Recognition**

Management

Skilled Staff

Users Community

Regional Stability

Resources

Faith

Dedication



SESAME Opening Ceremony, May 16, 2017

HM King Abdullah II at the opening of SESAME with Heads of the delegations of the SESAME Members, Directors-General of Intergovernmental Organizations, President SESAME Council and SESAME's Directorate. Left of the King, HRH Princess Sumaya, head of Jordan's delegation; and Fabiola Gianotti, Director General CERN; to his right, Irina Bokova, Director-General UNESCO; Carlos Moedas, EC Commissioner for Research, Science and Innovation; and Rolf Heuer, President-Elect SESAME Council. Directly behind the King, Chris Llewellyn Smith, President SESAME Council with on left Khaled Toukan, Director SESAME. Back far left Yukiya Amano, Director General IAEA

2018: SESAME became the first Associate of LEAPS

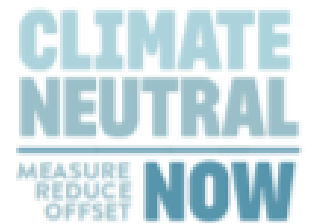


On signing the Declaration of Association to the LEAPS Consortium with Helmut Dosch, Chair of LEAPS and Chair of the DESY Board of Directors, Rolf Heuer, President of the SESAME Council.



2019: SESAME became the World's FIRST large accelerator complex fully powered by renewable energy – EU Support

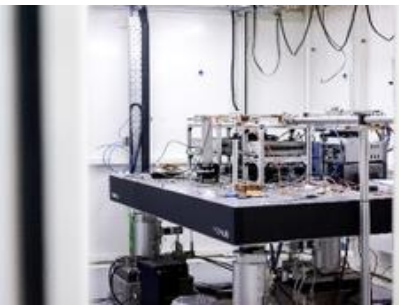
The world's first carbon neutral accelerator laboratory. This makes SESAME economically, as well as environmentally sustainable. It has signed the UN's Climate Neutral Now pledge.

The Climate Neutral Now logo, which includes the text "CLIMATE NEUTRAL" in large blue letters, a horizontal line, and "MEASURE REDUCE OFFSET NOW" in smaller blue letters below it.

**CLIMATE
NEUTRAL**
MEASURE
REDUCE
OFFSET **NOW**



**SESAME
STORAGE RING**



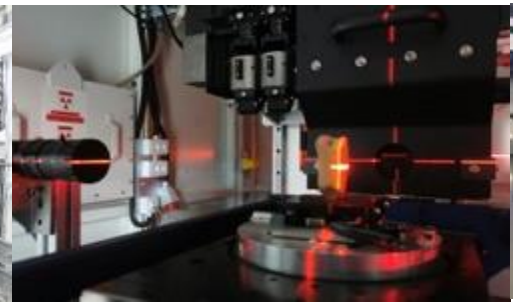
**BM08
XAFS/XRF**



**BM02
IR**



**ID09
MS/XPD**



**ID10
BEATS**



**ID11L
HESEB**

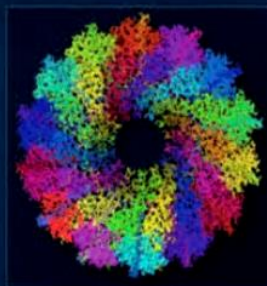


Illuminating Science

Environment
Food processing



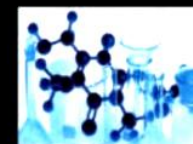
Biology
Medicine
Pharmacy
Cosmetics



Materials
Nanotechnology



Energy
Chemistry



We see the
invisible



Archaeology
Cultural heritage



Geophysics
Astrophysics

This document was produced with the support of the education authority of Versailles

Environment



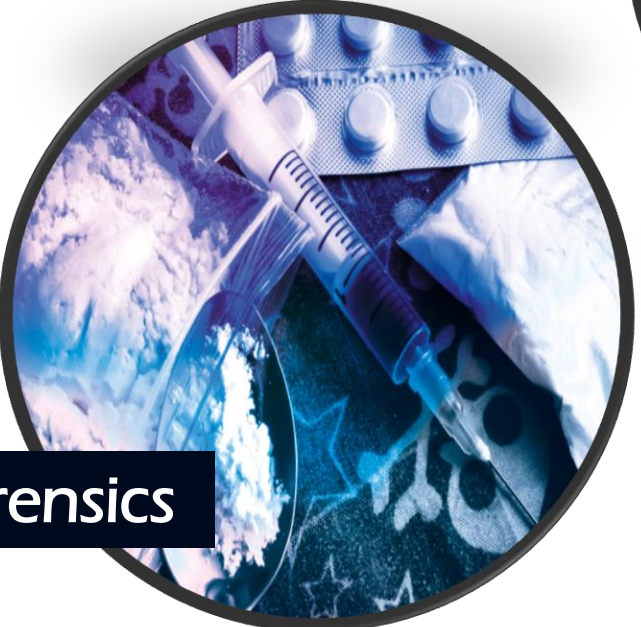
Textiles



Pharma



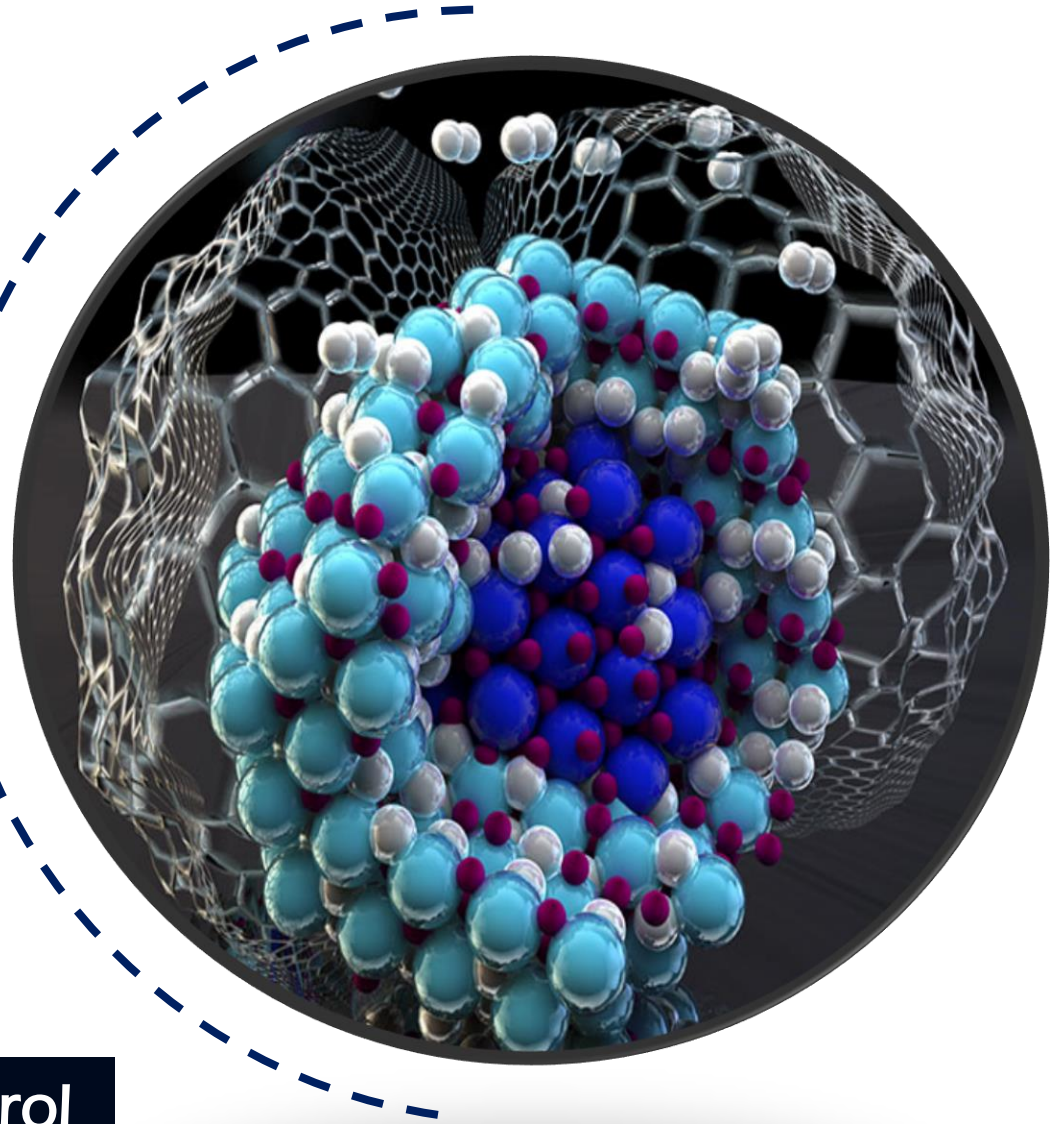
Forensics



Quality Control

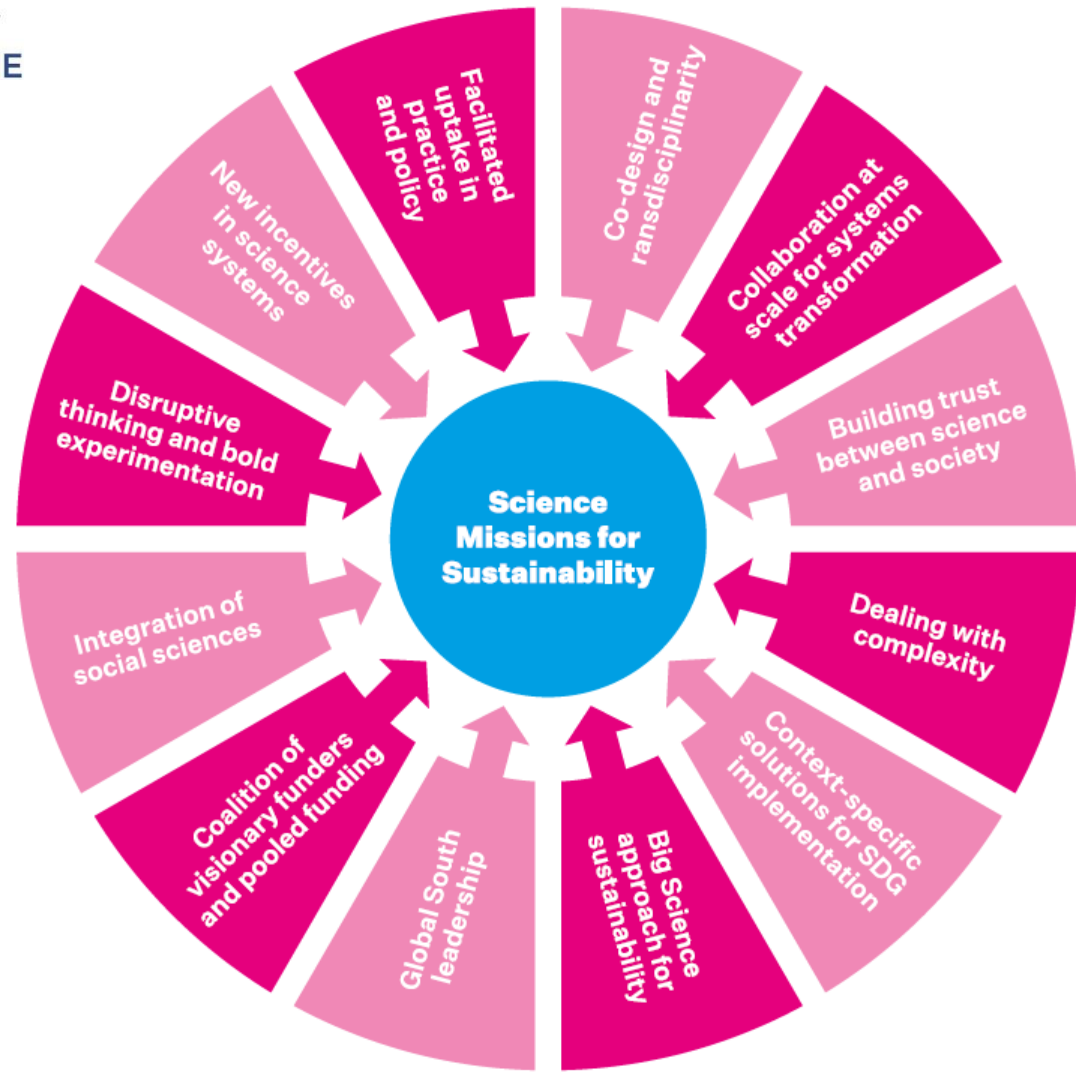


We start with materials..



+
Industry





“ISC: Science Missions for Sustainability”

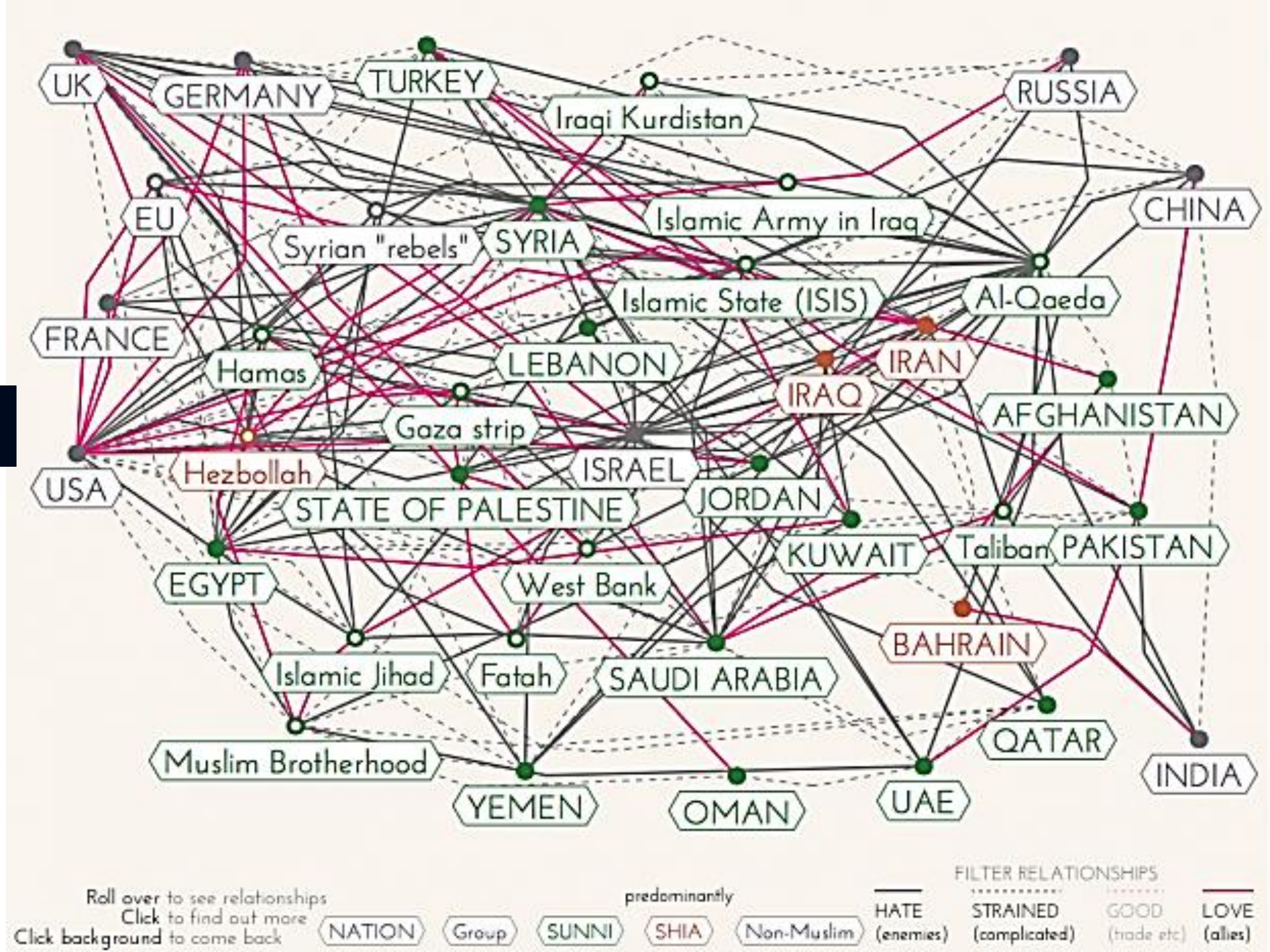
Science for Peace (& Society)



The theory..

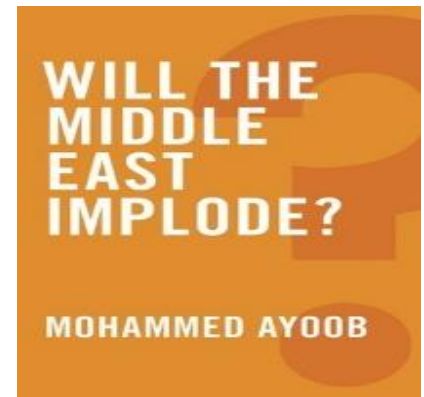
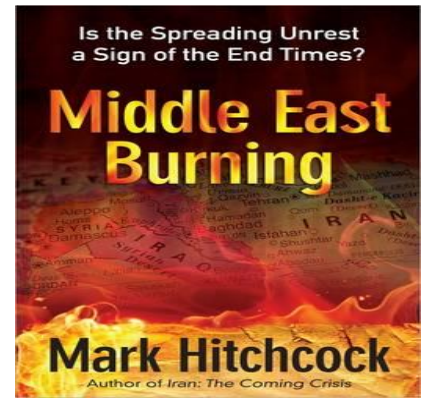
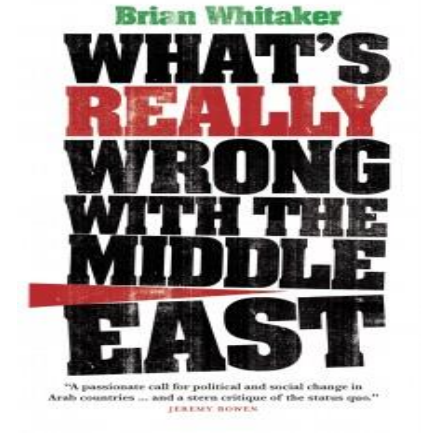
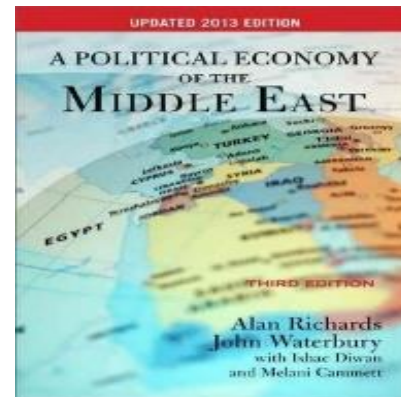
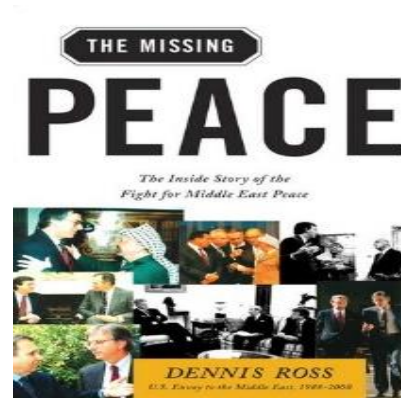
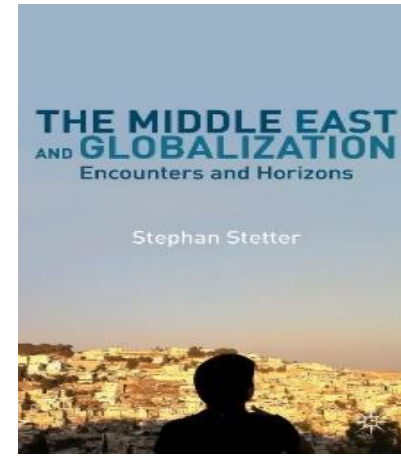
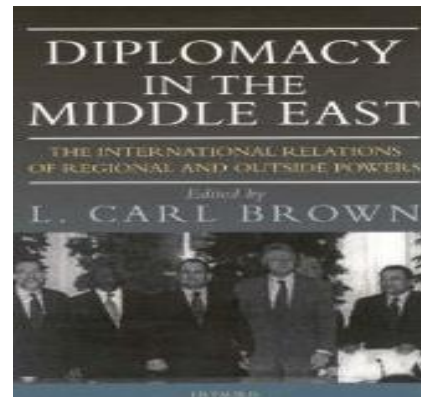
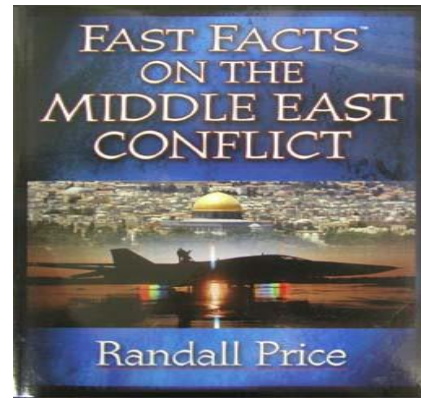
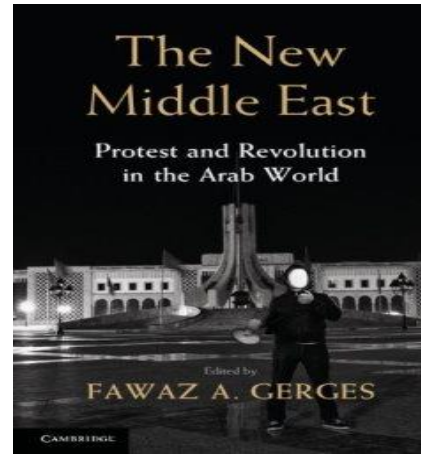
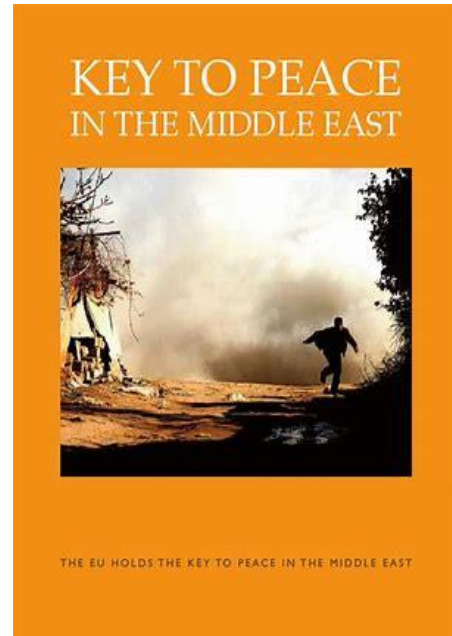
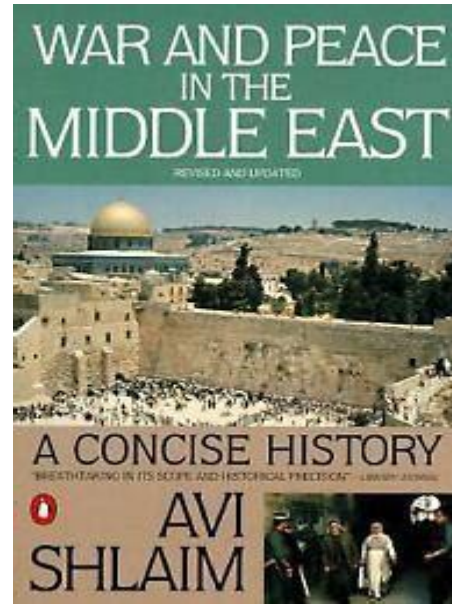
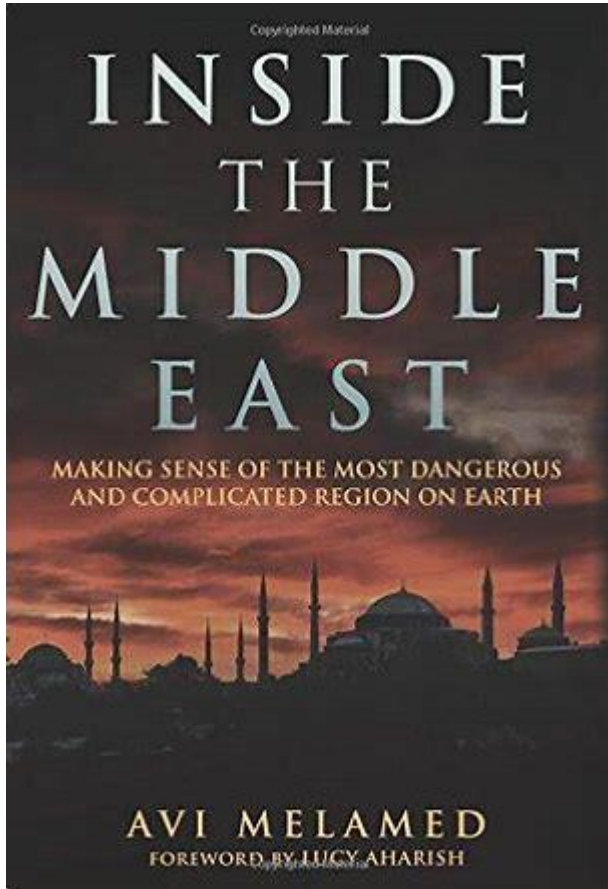


The experiment..



The Middle East: from bad to worse to.. another war..



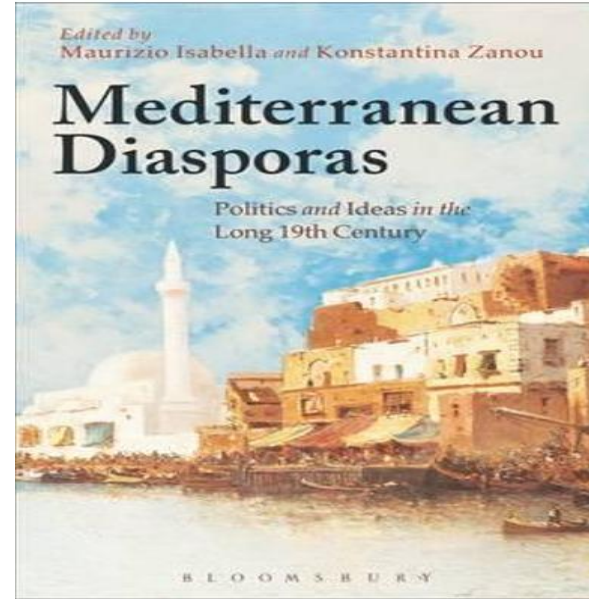
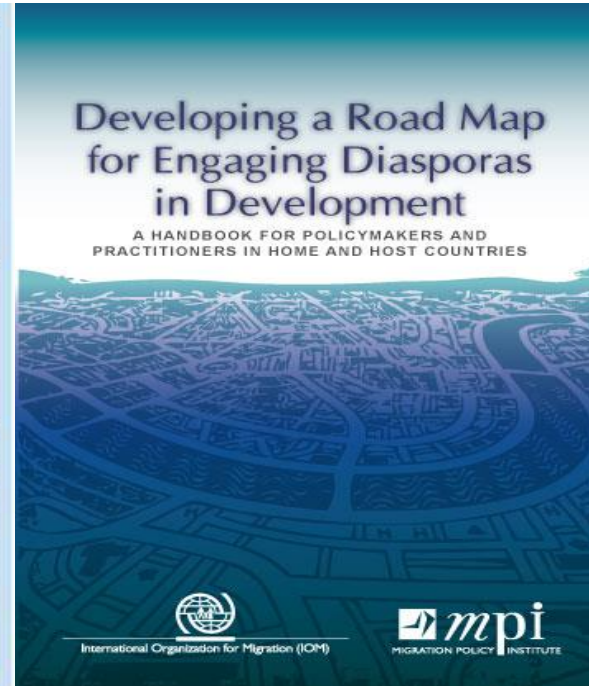
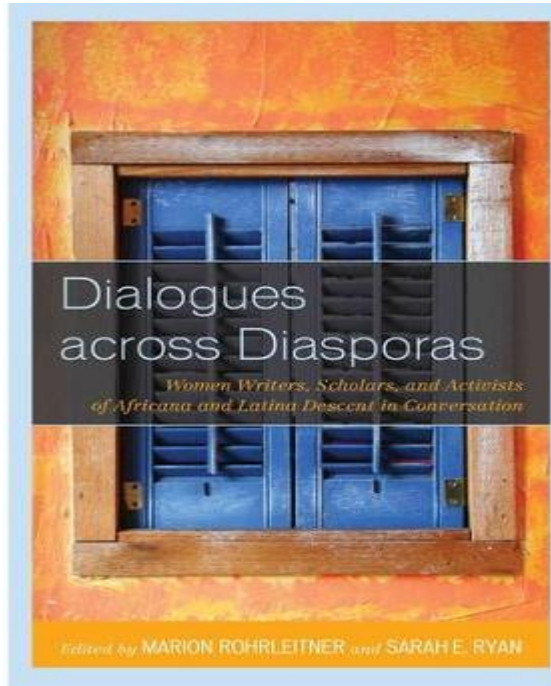


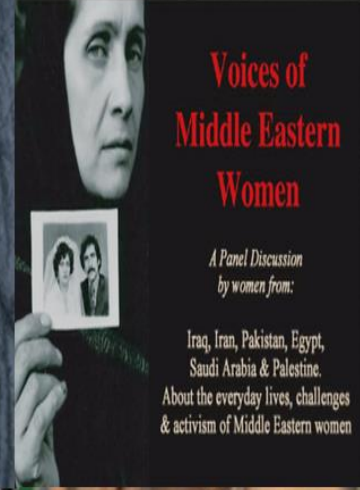
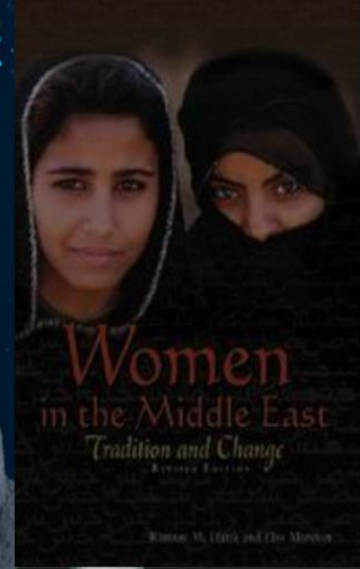
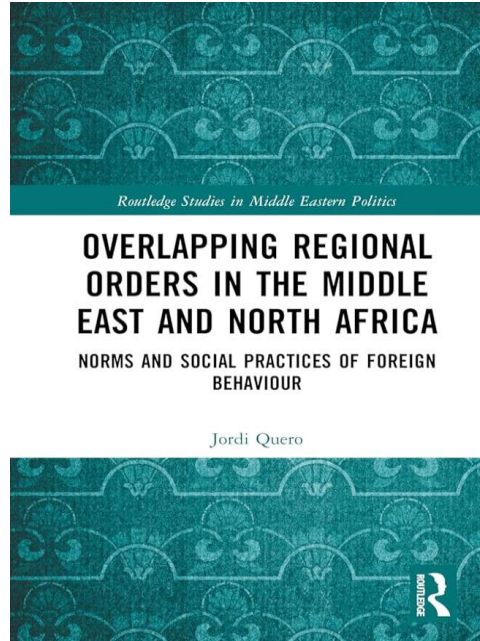
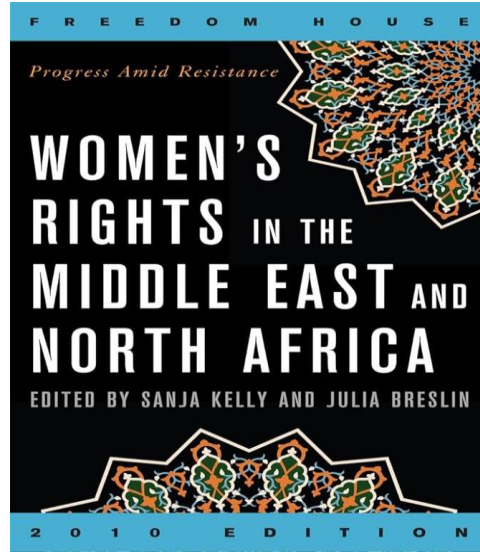
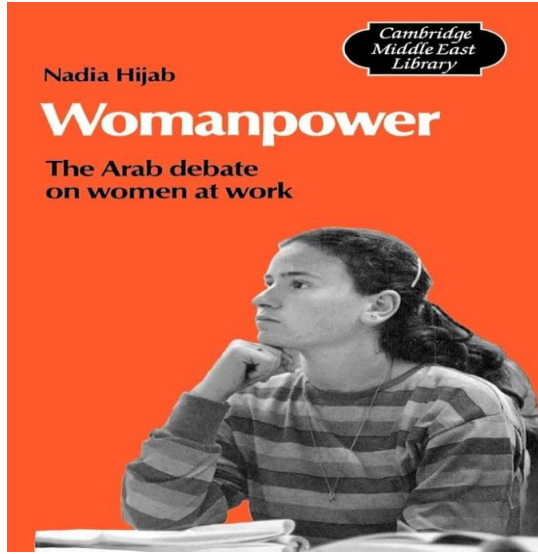
Brain-Drain reversal

“The map confirms that low and middle income countries are the most severely affected by inventor “brain drain”..”



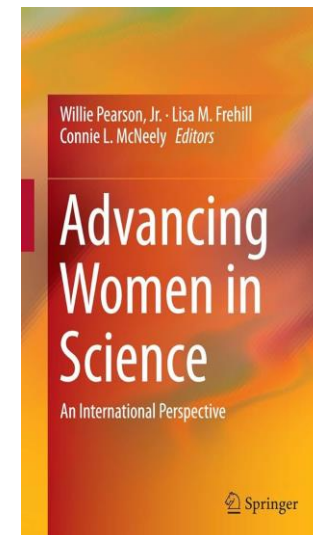
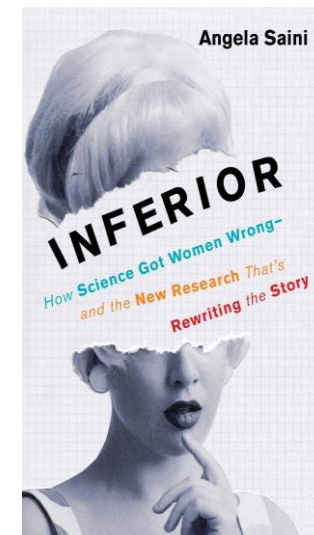
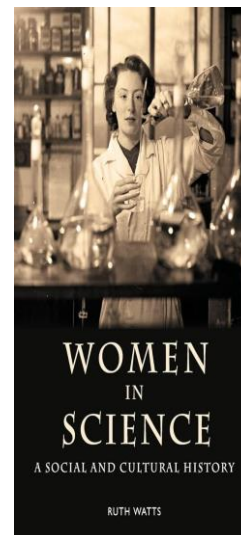
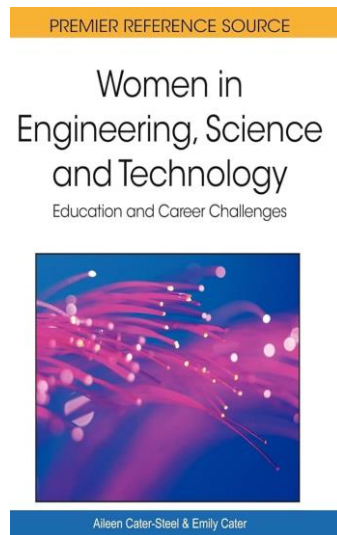
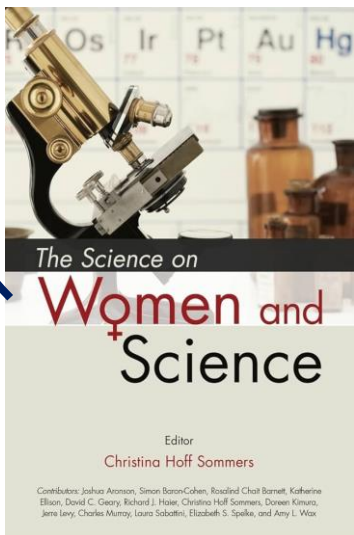
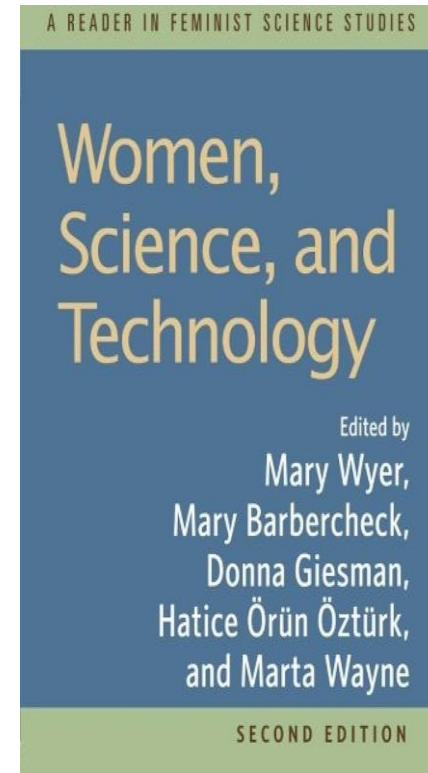
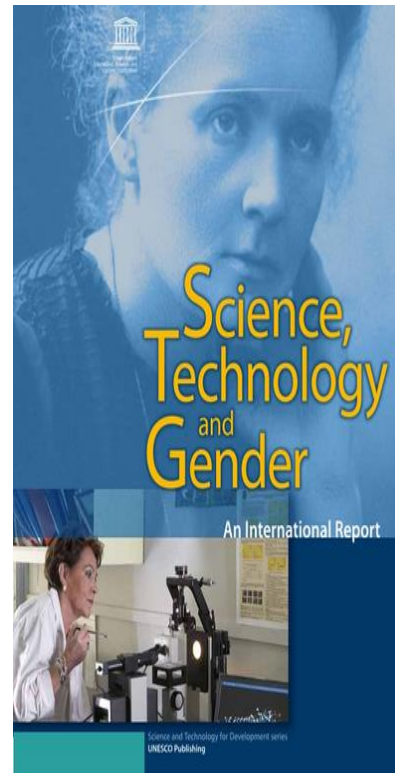
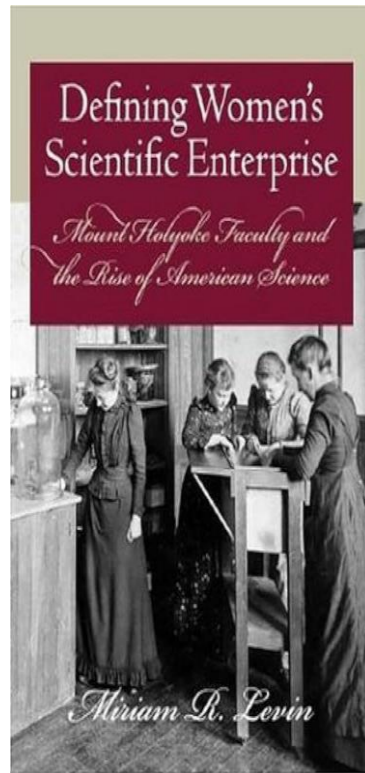
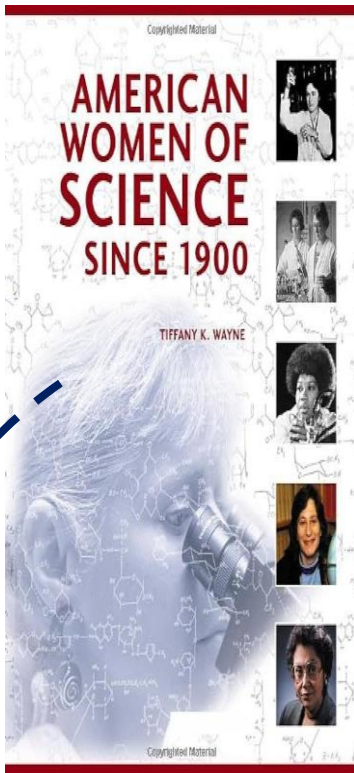
Large scale emigration with technical skill and knowledge



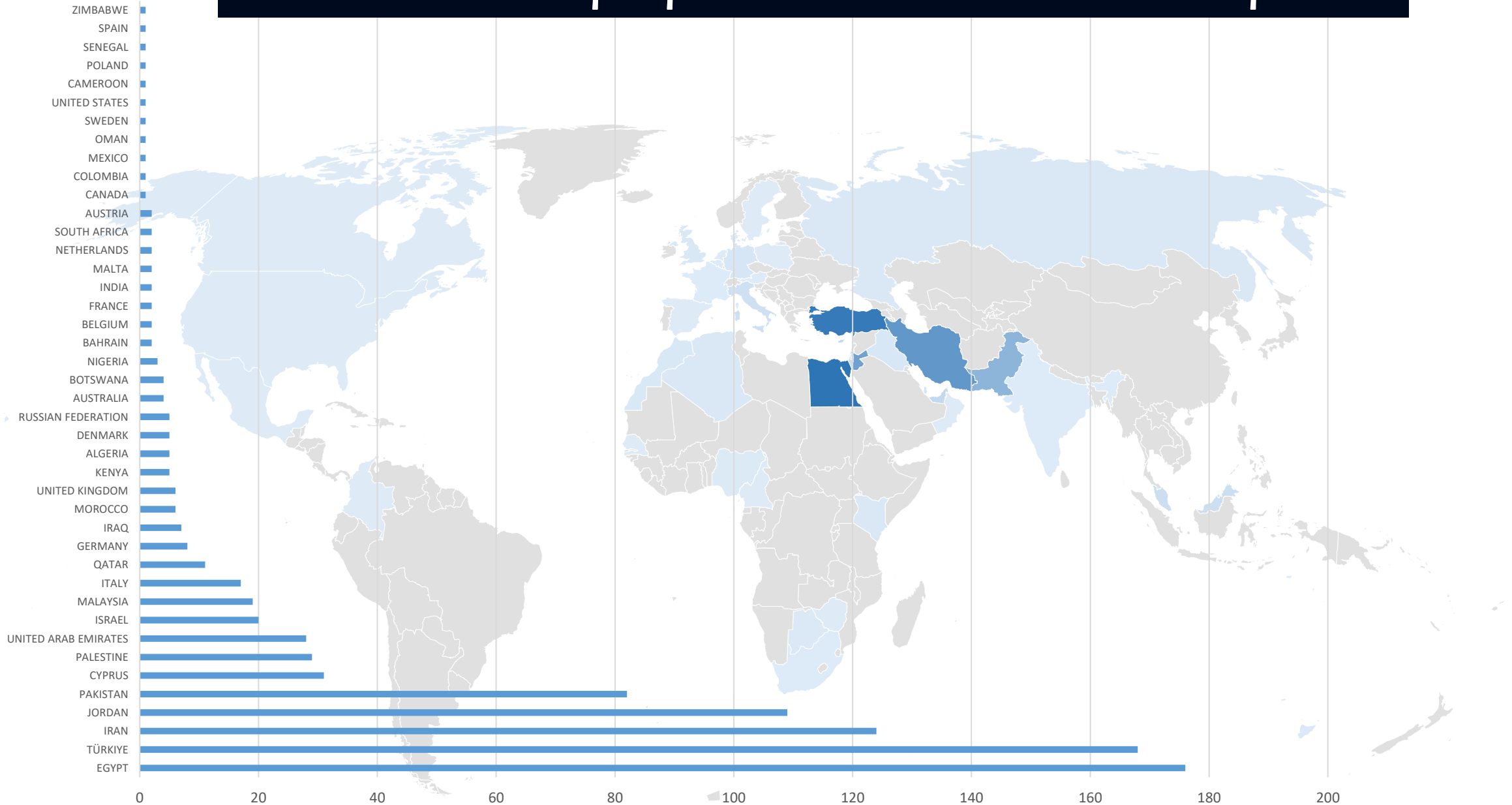




Equal Opportunity



1038 Submitted proposals: Growth and Development

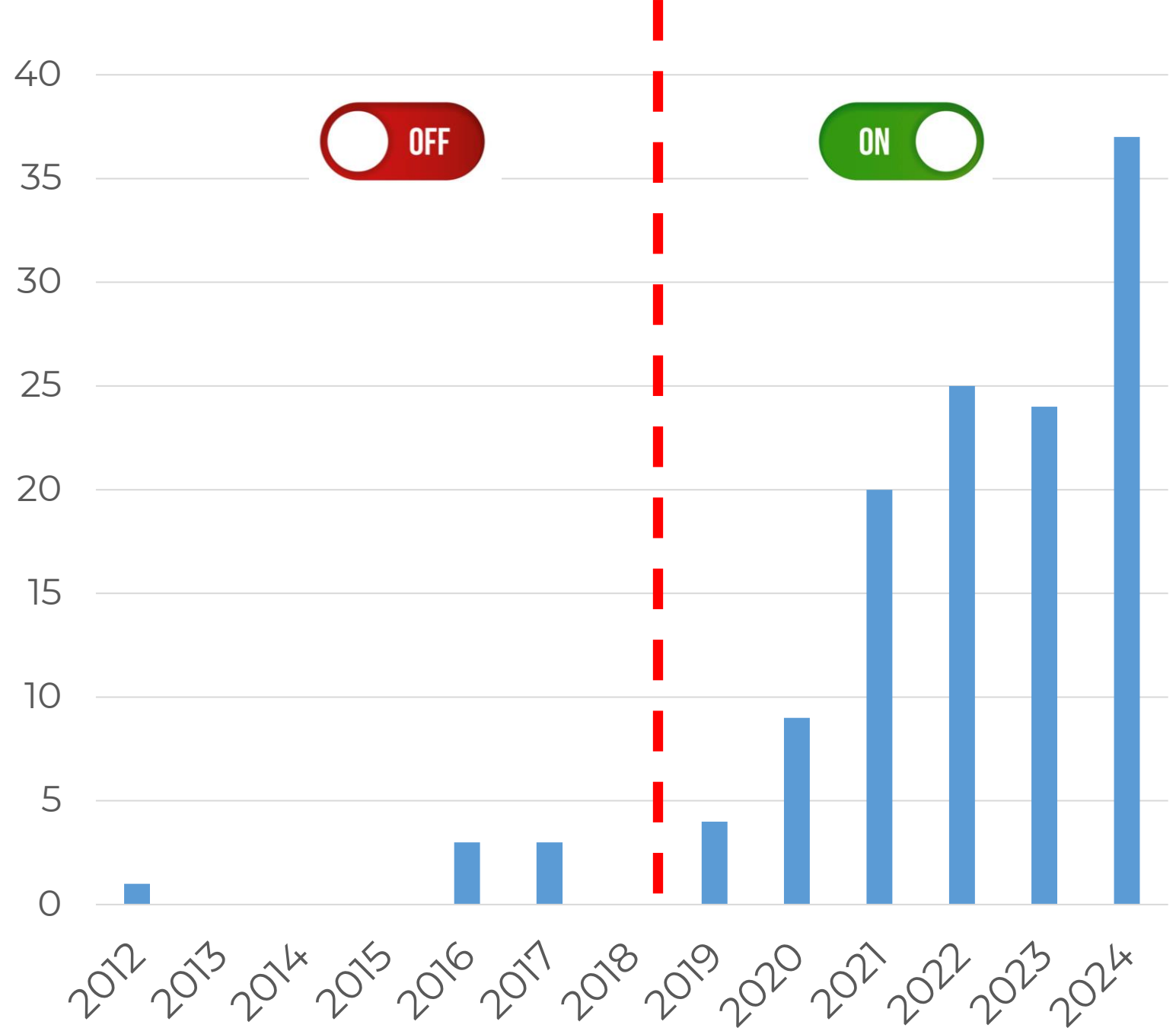


Publications

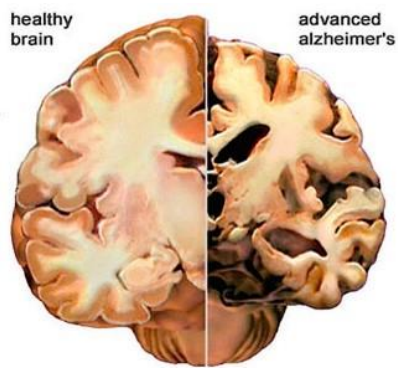
126

Peer-review publications until
November 2024

- Avg. scientific impact factor > 5
- 20% of publications have IF > 7



"Can Alzheimer's Disease be treated?." - Egypt



Spectrochimica Acta Part A: Molecular and Biomolecular Spectroscopy 239 (2020) 118421

Contents lists available at ScienceDirect

Spectrochimica Acta Part A: Molecular and Biomolecular Spectroscopy

journal homepage: www.elsevier.com/locate/saa

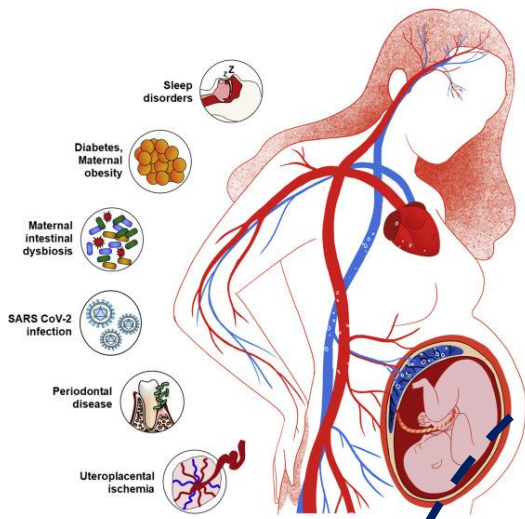
Synchrotron Fourier transform infrared microspectroscopy (sFTIRM) analysis of Al-induced Alzheimer's disease in rat brain cortical tissue

Cehan A.-R. Ahmed^{a,*}, W. El Hotaby^a, Lamyaa Abbas^a, Hadeer H.A. Sherif^a, Gihan Kamel^{b,c}, Safaa K.H. Khalil^a

^a Spectroscopy Dept., Physics Division, National Research Centre, 33 El Bohouth St. (Former El Tahrir St.) Dokki, P.O. Box 12622, Giza, Egypt

^b SESAME Synchrotron (Synchrotron-light for Experimental Science and Applications in the Middle East), Jordan

^c Department of Physics, Faculty of Science, Helwan University, Cairo, Egypt



"Insights on the 1001 reasons of Preeclampsia." - Jordan

Journal of Pharmaceutical and Biomedical Analysis 194 (2020) 113186

Contents lists available at ScienceDirect

Journal of Pharmaceutical and Biomedical Analysis

journal homepage: www.elsevier.com/locate/jbpa

Investigating the molecular structure of placenta and plasma in pre-eclampsia by infrared microspectroscopy

Lina A. Dahabiyeh^{a,*}, Randa S.H. Mansour^b, Shawqi S. Saleh^c, Gihan Kamel^{d,e}

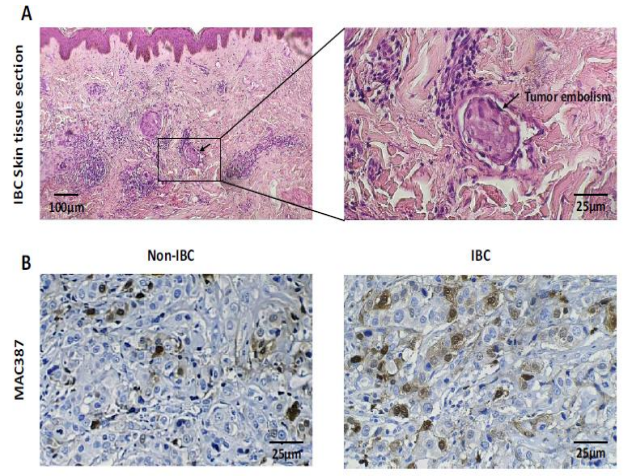
^a Department of Pharmaceutical Sciences, School of Pharmacy, The University of Jordan, Queen Rania St, Amman, 11942, Jordan

^b Faculty of Pharmacy, Philadelphia University, 19392, Amman, Jordan

^c Department of Obstetrics and Gynaecology, School of Medicine, The University of Jordan, 11942, Amman, Jordan

^d SESAME Synchrotron (Synchrotron-light for Experimental Science and Applications in the Middle East), 19252, Allan, Jordan

^e Department of Physics, Faculty of Science, Helwan University, Cairo, Egypt



Biochimica et Biophysica Acta (BBA) - Molecular Cell Research

Available online 3 October 2022, 119367

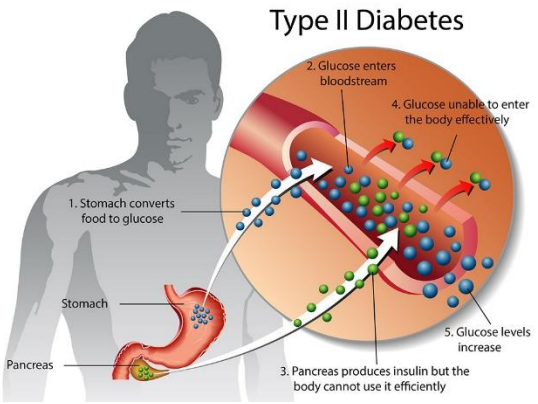
In Press, Journal Pre-proof

Research paper

Synchrotron Fourier-Transform Infrared Microspectroscopy: Characterization of *in vitro* polarized tumor-associated macrophages stimulated by the secretome of inflammatory and non-inflammatory breast cancer cells

Hossam Taha Mohamed^{a,b,c,d}, Gihan Kamel^{b,c,d}, Noura El-Husseiny^a, Aya Ali El-Sharkawy^a, Ahmed A. El-Sherif^a, Mohamed El-Shinawi^{e,f}, Mona Mostafa Mohamed^{a,h}

"Type 2 Diabetes Mellitus and Diabetic Nephropathy." - Egypt and Jordan



Spectrochimica Acta Part A: Molecular and Biomolecular Spectroscopy 264 (2022) 120259

Contents lists available at ScienceDirect

Spectrochimica Acta Part A: Molecular and Biomolecular Spectroscopy

journal homepage: www.elsevier.com/locate/saa

Investigating the molecular structure of plasma in type 2 diabetes mellitus and diabetic nephropathy by synchrotron Fourier-transform infrared microspectroscopy

Refat Nimer^{a,*}, Gihan Kamel^{b,c}, Motaz A. Obeidat^d, Lina A. Dahabiyeh^{e,*}

^a Department of Medical Laboratory Sciences, Jordan University of Science and Technology, 22110 Irbid, Jordan

^b SESAME Synchrotron (Synchrotron-light for Experimental Science and Applications in the Middle East), Jordan

^c Department of Physics, Faculty of Science, Helwan University, Cairo, Egypt

^d Department of Internal Medicine, Nephrology Division, Jordan University of Science and Technology, Irbid, Jordan

^e Department of Pharmaceutical Sciences, School of Pharmacy, The University of Jordan, 11942 Amman, Jordan

"Breast cancer cells." - Egypt

“Did she really have a skin disease?.” - Malta, UK and Spain





Spectrochimica Acta Part A: Molecular and Biomolecular Spectroscopy 261 (2021) 120073

Contents lists available at ScienceDirect

Spectrochimica Acta Part A: Molecular and Biomolecular Spectroscopy

journal homepage: www.elsevier.com/locate/saa

Mummified embalmed head skin: SR-FTIR microspectroscopic exploration

Despina Moissidou^a, Hayley Derricott^a, Gihan Kamel^{b,c,*}

^aBarts and the London School of Medicine and Dentistry, Queen Mary University of London, Malta Campus, Malta
^bSESAME (Synchrotron-light for Experimental Science and Applications in the Middle East), Allan, Jordan
^cDepartment of Physics, Faculty of Science, Helwan University, Cairo, Egypt

“Diagenesis of ancient human remains from the Eastern Mediterranean and the Near East.” - Egypt, Cyprus, Türkiye, Netherlands, Japan



Spectrochimica Acta Part A: Molecular and Biomolecular Spectroscopy 274 (2022) 121026

Contents lists available at ScienceDirect

Spectrochimica Acta Part A: Molecular and Biomolecular Spectroscopy

journal homepage: www.elsevier.com/locate/saa




Synchrotron Radiation Fourier Transform Infrared (SR-FTIR) spectroscopy in exploring ancient human hair from Roman period Juliopolis: Preservation status and alterations of organic compounds

K.O. Lorentz^{a,*}, G. Kamel^{b,c}, S.A.M. Lemmers^a, Y. Miyauchi^{a,d}, E. Çubukçu^e, A. Alpagut^f, A.M. Büyükkarakaya^{g,h}

“16th century Ottoman Tile from the Dome of the Rock, Jerusalem.” - UAE

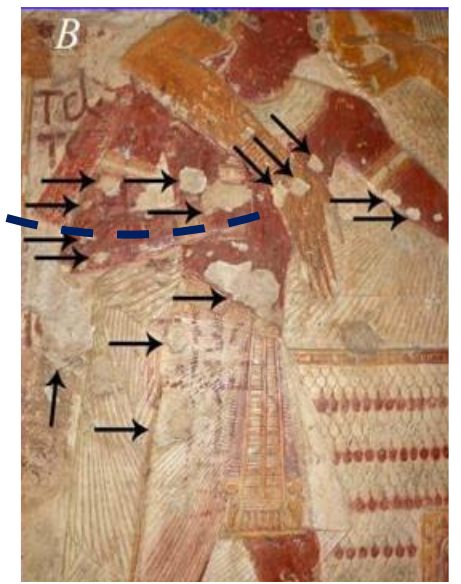


“Ancient fossil record of Earth (and potentially Mars?)” - Iraq and UK

“How can we fix an inner layer of wall paintings.” Egypt & Belgium



“Medallions from Ottoman period.” - Egypt



Applied Catalysis B: Environmental 256 (2019) 117808

Contents lists available at ScienceDirect

Applied Catalysis B: Environmental

journal homepage: www.elsevier.com/locate/apcatb



International Journal of Hydrogen Energy
Volume 47, Issue 25, 1 September 2022, Pages 32181–32201



Hydrogen adsorption on Co^{2+} - and Ni^{2+} -exchanged -US-Y and -ZSM-5. A combined sorption, DR UV-Vis, synchrotron XRD and DFT study

Nurkan Sarohan^a, M. Oltus Ozbek^b, Yasemin Kaya^a, Mahmoud Abdellatif^c, Bahar Ipek^{a,*,*}



ACS MATERIALS LETTERS

www.acsmaterialsletters.org

Robust Barium Phosphonate Metal–Organic Frameworks Synthesized under Aqueous Conditions

Khalifah A. Salmeia,^a Simone Dolabella,² Dambarudhar Parida,³ Terry J. Frankcombe, Akef T. Afaneh, Kyle E. Cordova, Bassem Al-Maythalyony, Shanyu Zhao, Romain Civioc, Ali Marshdeh, Bernhard Spingler, Ruggero Frison, and Antonia Neels^{a*}

Cite This: *ACS Materials Lett.* 2021, 3, 1010–1015

Read Online

Exceptionally active and stable catalysts for CO_2 reforming of glycerol to syngas

Selin Bac^a, Zafer Say^{b,c}, Yusuf Kocak^b, Kerem E. Ercan^b, Messaoud Harfouche^d, Emrah Ozensoy^{b,c,*,*}, Ahmet K. Avci^{a,*,*}



pubs.acs.org/cm

Article

Functionality-Induced Locking of Zeolitic Imidazolate Frameworks

Tongtong Xu, Beibei Zhou, Yu Tao, Zhaolin Shi, Wentao Jiang, Mahmoud Abdellatif, Kyle E. Cordova, and Yue-Biao Zhang^{*}

Received: 1 June 2020 | Revised: 6 July 2020 | Accepted: 11 July 2020
DOI: 10.1002/er.5320



RESEARCH ARTICLE

ENERGY RESEARCH WILEY

Investigation of Ti-substitution effects on structural and electrochemical properties of $\text{Na}_{0.67}\text{Mn}_{0.5}\text{Fe}_{0.5}\text{O}_2$ battery cells

Serdar Altin¹, Sebahat Altundag¹, Emine Altin², Erdinc Oz³, Messaoud Harfouche⁴, Ali Bayri¹

Int J Environ Res (2022) 16:40
<https://doi.org/10.1007/s41742-022-00421-w>



RESEARCH PAPER

Temperature-Dependent Speciation Analysis of Chromium Immobilized in Calcium Hydroxyapatite Matrix

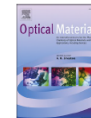
Sajid Iqbal¹, Yasir Faiz¹, Messaoud Harfouche², Muhammad Saifullah¹, Jong-Il Yun³



Contents lists available at ScienceDirect

Optical Materials

journal homepage: www.elsevier.com/locate/optmat



Research Article

Structural, optical and shielding properties of transition metals (R: Mg, Sn and Bi) doped nano ZnMn_2O_4 : A comparative study

Zein K. Heiba^{a,*,*}, M.M. Ghannam^a, M. Abdellatif^b, Ali Badawi^{c,*}, Mohamed Bakr Mohamed^{a,d}

Radiation Physics and Chemistry 177 (2020) 108992



Contents lists available at ScienceDirect

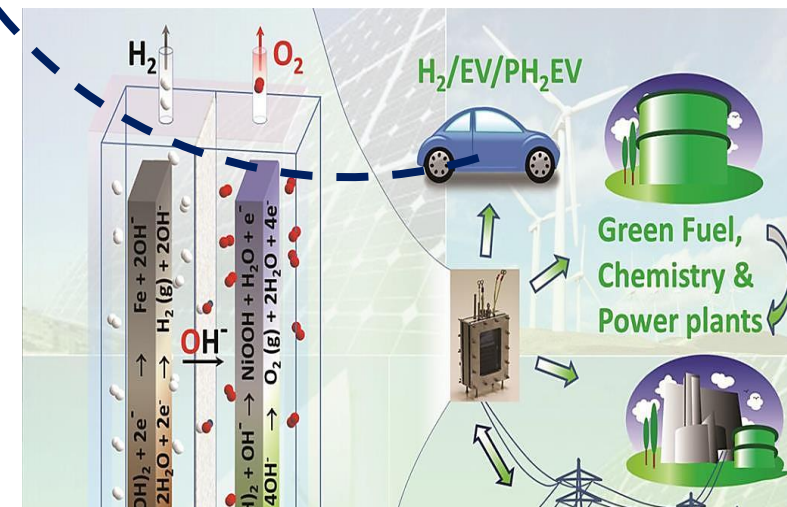
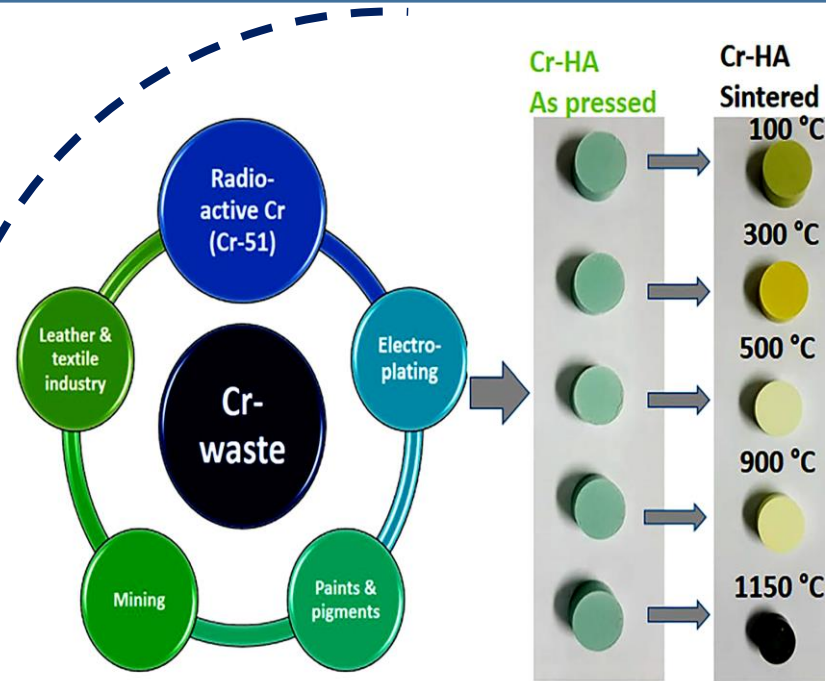
Radiation Physics and Chemistry

journal homepage: www.elsevier.com/locate/radphyschem




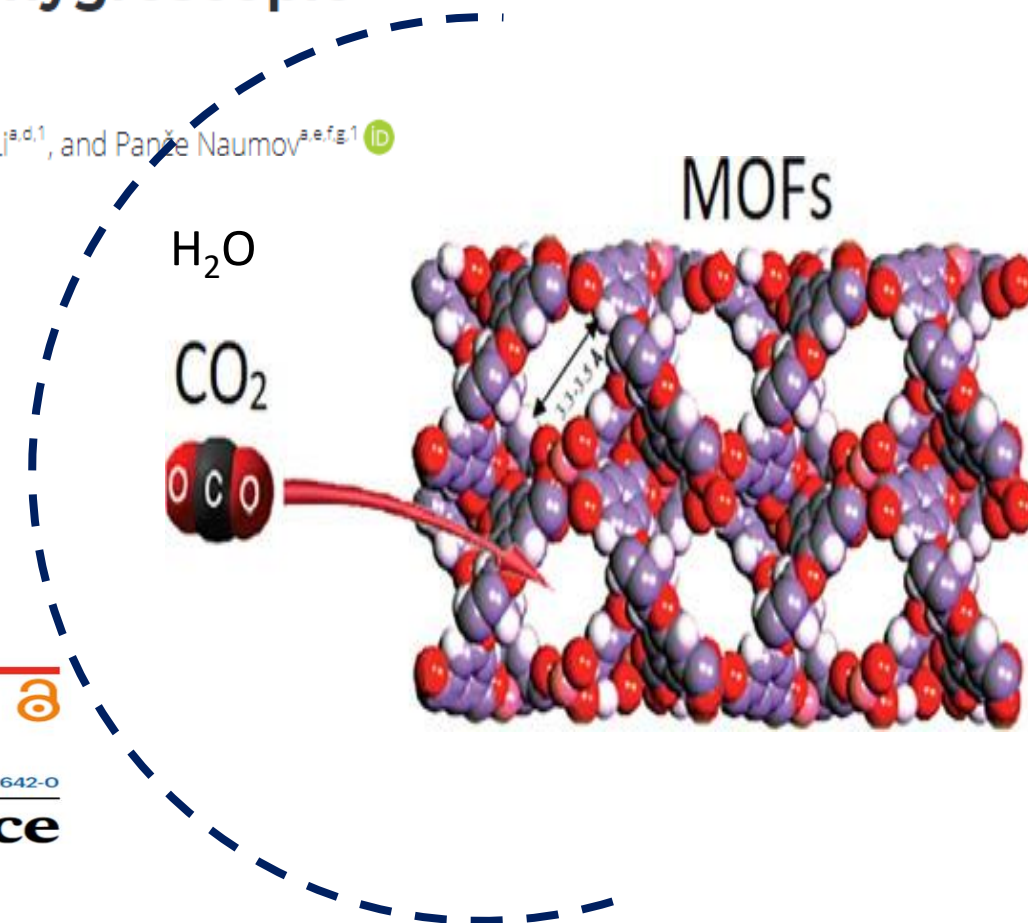
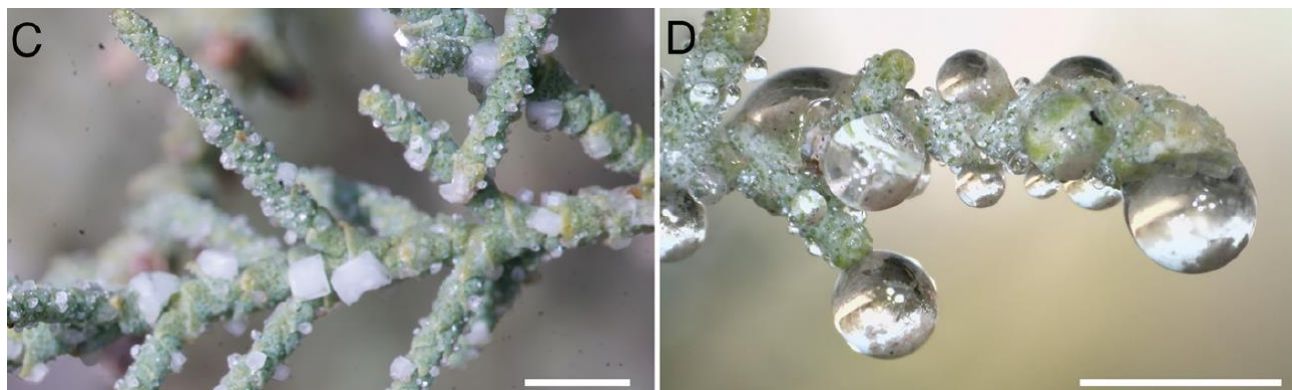
Local lattice relaxation around Tl substitutional impurities in a NaI(Tl) scintillator crystal

A. Filippini^{a,*,*}, G. Profeta^{b,c}, N. Di Marco^{b,c}, V. Zema^{b,d}, K. Schäffner^e, F. Reindl^{f,g}, M. Harfouche^b, A. Trapananti^d, A. Di Cicco^d



Harvesting of aerial humidity with natural hygroscopic salt excretions

Marieh B. Al-Handawi^a , Patrick Commins^a , Robert E. Dinnebier^b, Mahmoud Abdellatief^c, Liang Li^{a,d,1}, and Panče Naumov^{a,e,f,g,1} 



nature communications



Article

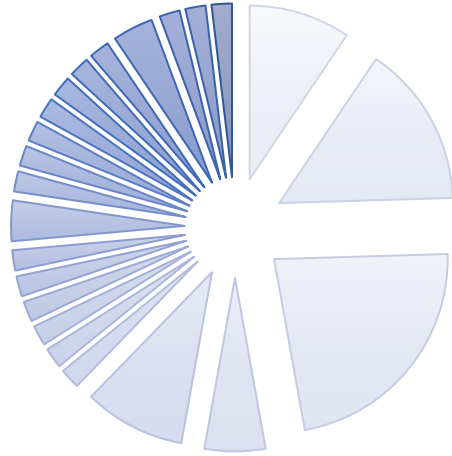
<https://doi.org/10.1038/s41467-022-32642-0>

Environmentally adaptive MOF-based device enables continuous self-optimizing atmospheric water harvesting

Received: 22 April 2022

Accepted: 9 August 2022

Husam A. Almassad¹, Rada I. Abaza¹, Lama Siwwan¹, Bassem Al-Maythalyony¹ & Kyle E. Cordova¹  



- Cyprus
- Türkiye
- Malta
- France
- Malaysia
- UK
- South Africa**
- Israel
- Algeria**
- Nigeria**
- Senegal**
- Jordan
- Iran
- Germany
- Palestine
- Pakistan
- Qatar
- Mexico
- Benin**
- Morocco**
- Botswana**
- Egypt**
- Italy
- Belgium
- Japan
- UAE
- Iraq
- Colombia
- Cameeron**
- Kenya**
- Zimbabwe**



.. Transferring the know-how through collaborations, training opportunities, and networking proves to establish a tangible implementation of the SDGs..



The next mile...

Over 60 worldwide, None in Africa.



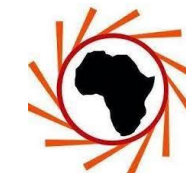
Worldwide Synchrotron facilities



Towards the African Light Source

The Africa Light Source Foundation

Towards a Lightsource for the African Continent














Memoranda of Understanding
 Advanced Light Source Facilities
 Synchrotron-Light for Experimental Science and Applications in the Middle East (SESAME)

International Institutions / Organisations

 Lightsources for Africa, the Americas, Asia and Middle East and the Pacific (LAAAMP)

Letters of Support






African Institutions / Organisations

-  African Crystallography Association Steering Committee (AfCA-SC), Africa
-  Ghana Academy of Arts and Sciences, Ghana
-  African Seismological Commission (AfSC), Africa
-  International Union of Geodesy and Geophysics (IUGG), Africa
-  Network of African Science Academies (NASAC), Africa
-  South African Institute of Physics (SAIP), South Africa
-  Ministry of Environment, Science, Technology & Innovation (MESTI), Ghana
-  Federation of African Medical Physics Organizations, FAMPO, Africa
-  Mbarara University of Science and Technology, Faculty of Science, Uganda
-  African Physical Society (AfPS)
-  BioStruct Africa, Africa
-  African Materials Research Society (AMRS), Africa



Advanced Light Source Facilities

-  Diamond Light Source, UK
-  Centre for Advanced Microstructures and Devices (CAMD) Louisiana State University, USA
-  European XFEL, Europe
-  Paul Scherrer Institute (PSI), Switzerland
-  Elettra Sincrotrone Trieste, Italy
-  European Organization for Nuclear Research (CERN)
-  The European Synchrotron Radiation Facility (ESRF)
-  MAX IV laboratory, Sweden
-  Synchrotron SOLEIL, France
-  National Synchrotron Light Source II (NSLS II), USA
-  Australian Synchrotron (ANSTO), Australia
-  Singapore Synchrotron Light Source NUS
-  National Synchrotron Radiation Research Center (NSRRRC), Taiwan
- 

International Institutions / Organisations

-  International Center for Theoretical Physics (ICTP)
-  International Union of Pure and Applied Chemistry (IUPAC)
-  International Union of Pure and Applied Physics, (IUPAP)
-  International Union of Crystallography (IUCr)
- 

External National Institutions / Organisations

-  The Cockcroft Institute of Accelerator Science and Technology, UK)
-  US Particle Accelerator School (USPAS), USA
-  National Society of Black Physicists (NSBP), USA

“Science alone cannot solve the many political, security, and economic problems that we are facing today. However, science diplomacy still has an important role to play in addressing health, environment, energy, water, and food challenges that contribute to regional instability.”

Thank you

