Visegrad Group (V4) + Japan
Innovation and Industry
Joint Science Diplomacy Seminar

https://atomdec.info/

"Atomic Design of Carbon-Based Materials for New Normal Society"

Acronym: AtomDeC

Amrita Jain
Secondary Leader AtomDeC
Institute of Fundamental Technological Research
Polish Academy of Science, Warsaw, Poland
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Title of the project: “Atomic Design of Carbon-Based Materials for New Normal Society”.

https://atomdec.info/

Acronym: AtomDeC

External collaborator

Canada

Dr. Robert K. Szilagyi

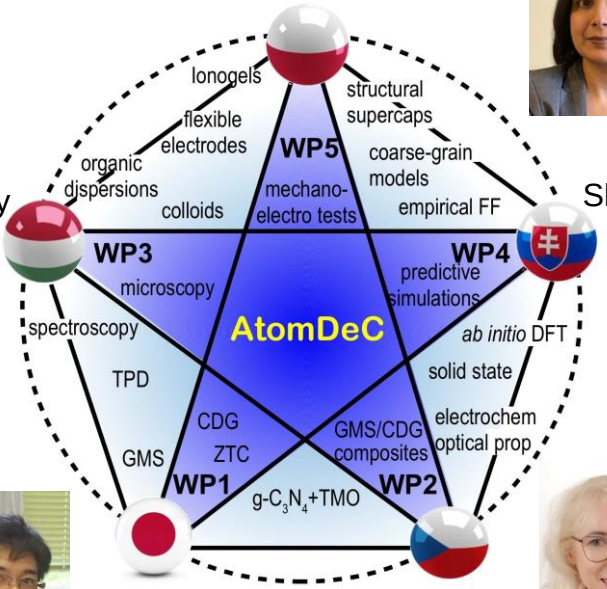
The University of British Columbia

Secondary Project Leader:
Dr. Amrita Jain

Polish Academy of Science

Dr. Tamás Szabó

University of Szeged



Dr. Eva Scholtzová

Slovak Academy of Science

Principal Project Leader:
Dr. Hirotomo Nishihara

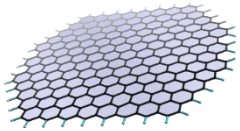
Tohoku University

Dr. Monika Michalska

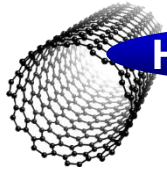
VŠB-Technical University of Ostrava

Carbon materials

Fullerene



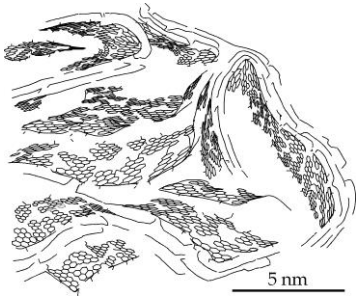
Graphene



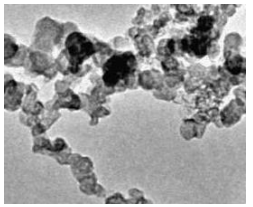
Nanotube

High performance

Expensive



Activated carbon



Carbon black

Nanocarbons

Carbon materials

Practical

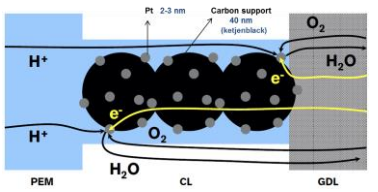
Purification, deodorant

N_2/O_2 separation

AS ONE web page

IWATANI web page

Batteries

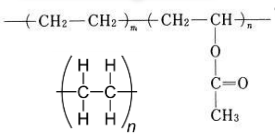


NGK web page

Space, airplane, transportation

Sports goods

Catalysts



Medicine

KUREHA web page

Carbon materials are widely used for various applications.
But, a poor structure controllability hampers further development.

Objective of the project

Edge plane

Catalysis, chemical stability, corrosion

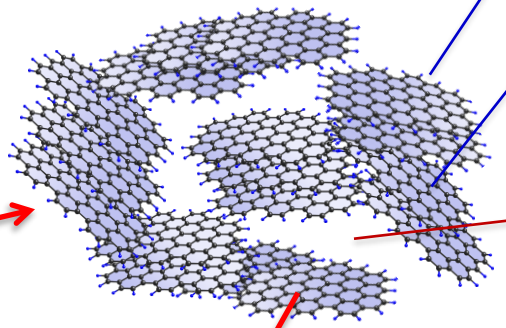
Basal plane

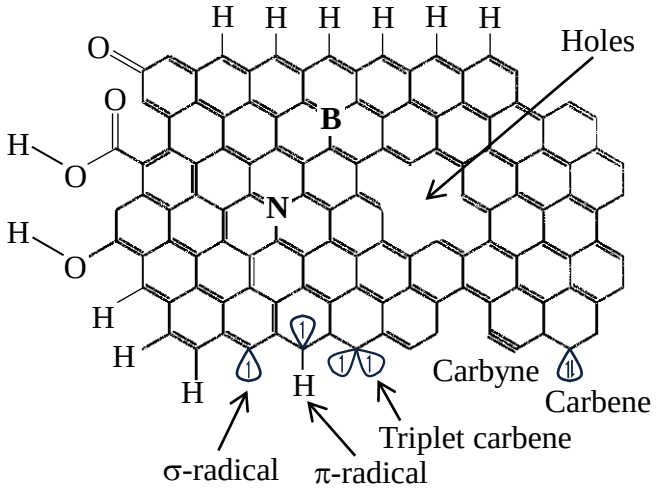
Conductivity, chemical stability, mechanical strength and elasticity

Nanopores

Adsorption, molecular sieve, mass transfer

Very complex structure





The development of new science & technologies which allow atomic design of carbon-based materials is demanded.

"Atomic Design of Carbon-Based Materials for New Normal Society"

Team

Japan

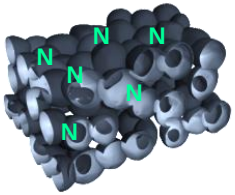
WP1

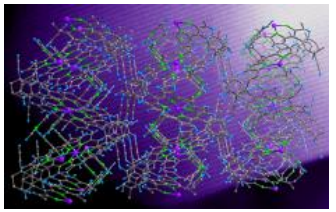
Synthesis of atomically designed carbon-based materials

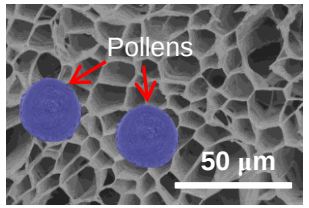
Nanoporous graphene, B,N,S,P-doping, MOF-like carbon alloys, honeycomb monoliths

PL: Dr. Hirotomo Nishihara

WP1, WP2 Synthesis







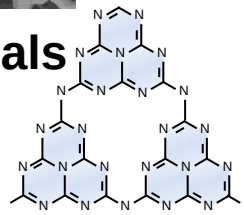
Czech

WP2

Synthesis of atomically designed carbon-based composite materials

g-CN materials, inorganic materials

Dr. Monika Michalska



Hungary

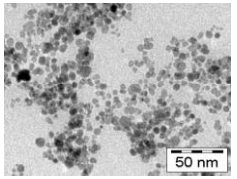
Work Package 3

WP3 Analytics

Comprehensive characterisation at the atomic/molecular/colloidal scale

2D carbon nanosheets, analysis of colloidal systems, nano-ESCA

Dr. Tamás Szabó



Slovakia

Canada

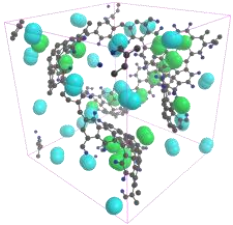
Work Package 4

WP4 Modeling

Modelling of atomically designed carbon-based materials

Theoretical calculations, synchrotron analysis

Dr. Eva Scholtzová **Dr. Robert K. Szilagyi**



Poland

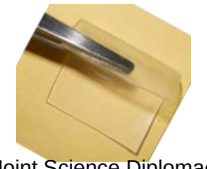
Work Package 5

WP5 Devices

Emerging applications and technological implications

Polymer electrolytes, flexible devices, supercapacitors

SPL: Dr. Amrita Jain



International advisory board members

Prof. Magda Titirici
Imperial College London

Prof. Ljubisa Radovic
The Pennsylvania State University

Prof. Siegfried Eigler
Freie Universität Berlin

Dr. Stephan Irle
Oak Ridge National Laboratory

Prof. Diego Cazorla-Amorós
Universidad de Alicante

World top scientists support the AtomDeC project!

Targets of the project

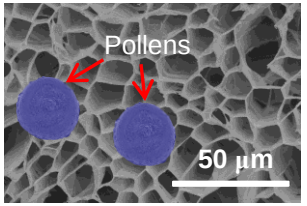
WP1, WP2 Synthesis

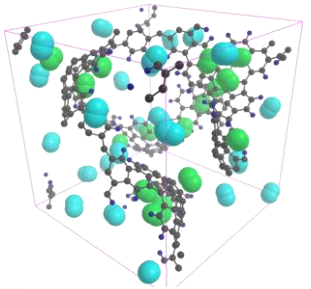
WP3 Analytics

WP4 Modeling

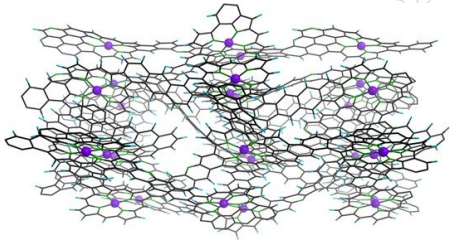
WP5 Devices

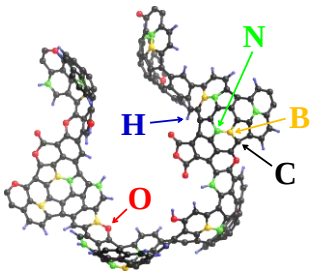
Expected achievements for new normal society

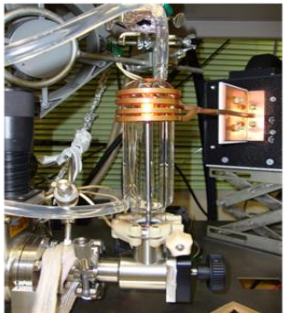




- High throughput COVID-19 masks/filter
- Supercapacitors (double energy density)
- Flexible supercapacitors for extreme environments
- Ionic-liquid based green electrolytes
- CO_2 fixation and conversion into C1 and C2 compounds
- Materials for environmental hazard mitigation
- New type power generation devices
- Heat-pumps using natural refrigerants



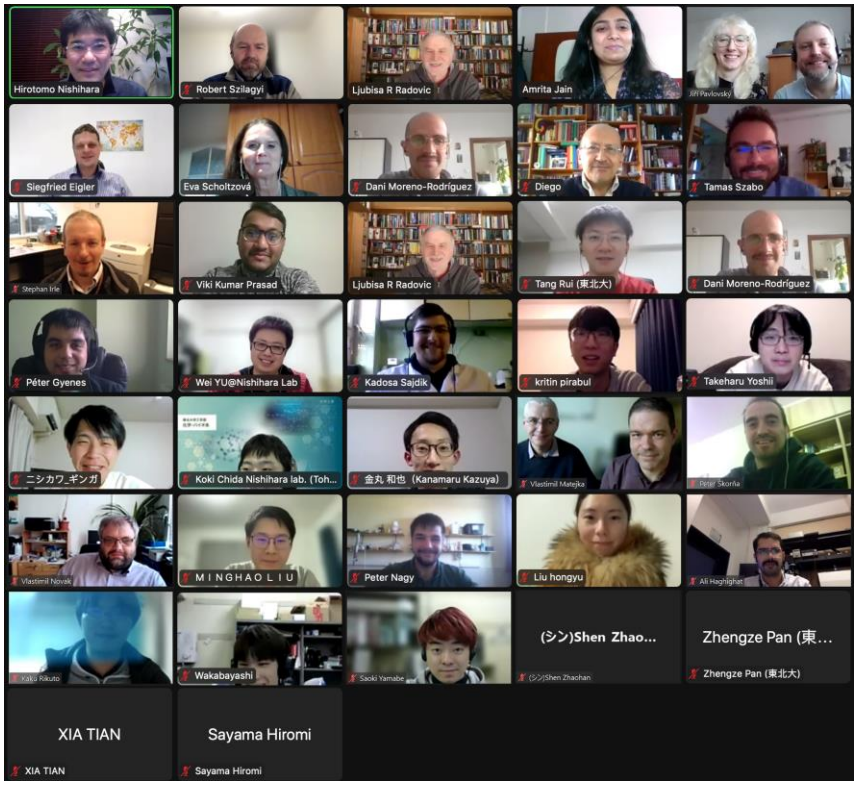




AtomDeC Journey so far..

- Monthly AtomDeC group meeting to review the progress and discuss the next steps.
- Individual WP meetings to discuss one to one research plans and executions
- From 14th March to 17th March, Dr Jain and Dr Michalska will visit Dr Szabo, University of Szeged

- Successfully organized Kick off Meeting on 17th and 18th Jan 2022 which was attended by AtomDeC members and Advisory Board, followed by Poster Presentations by students and colleagues of in-house labs.



Glimpse of Kick-off Meeting-AtomDeC

Thank you!!

For regular updates of the activities, please do visit: **atomdec.info**