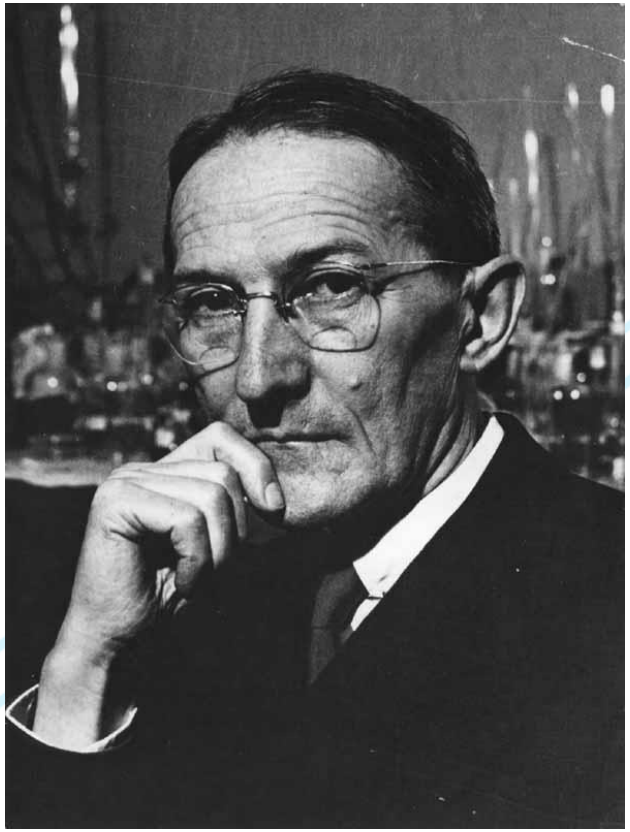
J. Heyrovský Institute of Physical Chemistry

The Czech Academy of Sciences

Continuing the legacy of Prof. Jaroslav Heyrovský



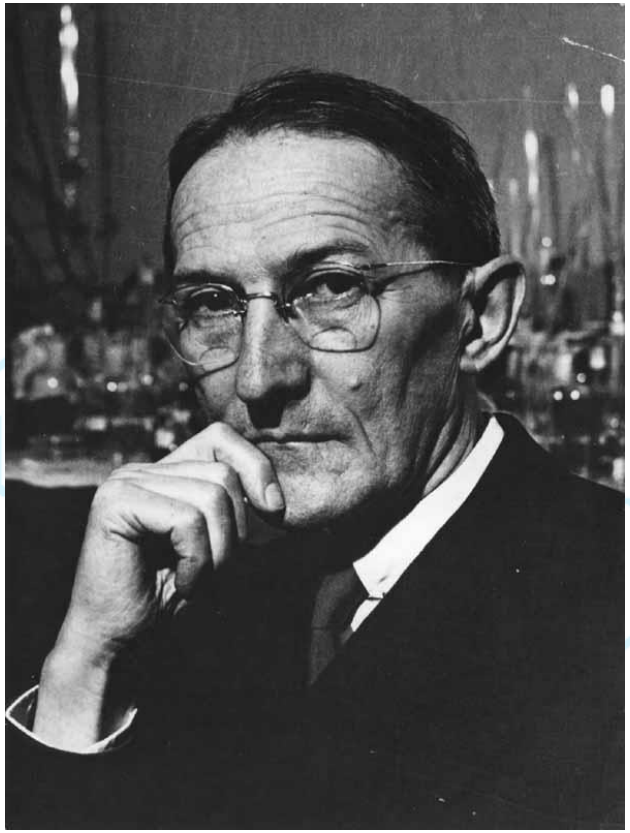
Nobel Prize in Chemistry (10.12.1959)

J. Heyrovský Institute of Physical Chemistry

The Czech Academy of Sciences

The legacy of Prof. Heyrovský

- Highest Scientific Excellence

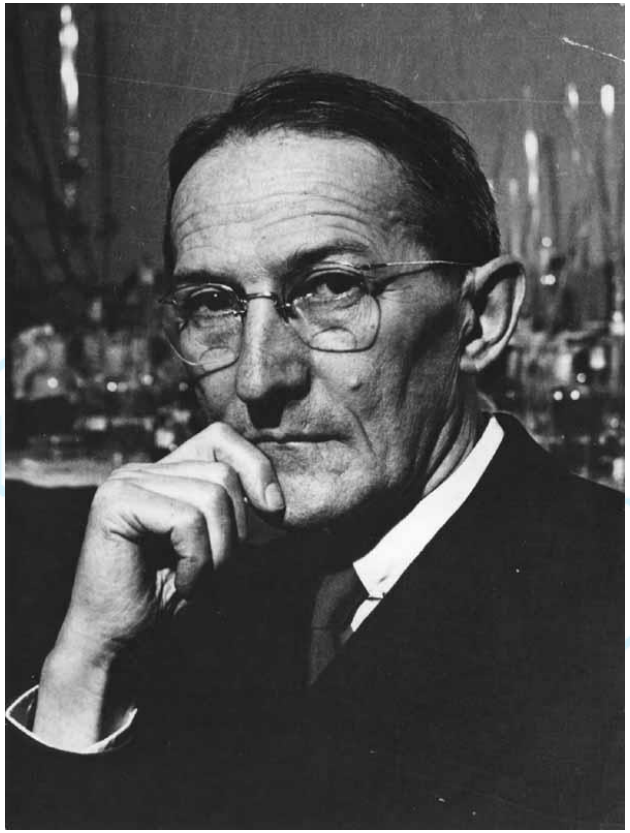


J. Heyrovský Institute of Physical Chemistry

The Czech Academy of Sciences

The legacy of Prof. Heyrovský

- Highest Scientific Excellence
- Scientific Ethics and Integrity
- International Openness
- Giving Opportunities to Perspective Scientists



J. Heyrovský Institute of Physical Chemistry

HR EXCELLENCE IN RESEARCH

Scientific Ethics and Integrity

In January 2019 the J. Heyrovský Institute obtained the "**Human Resources Excellence in Research Award**"

The **HR Award is** awarded by the European Commission to research institutions that implement a personnel strategy based on the 40 principles of the **European Charter for Researchers** and the **Code of Conduct for the Recruitment of Researchers**.

Supported by the Ministry of Education, Youth and Sport

- Rozvoj kapacit ÚFCH JH, v. v. i. pro výzkum a vývoj (CZ.02.2.69/0.0/0.0/16_028/0006251) obtained in 2017
- Rozvoj kapacit ÚFCH JH, v. v. i. pro výzkum a vývoj II – recommended for funding

EUROPEAN UNION
European Structural and Investment Funds
Operational Programme Research, Development and Education

MINISTRY OF EDUCATION, YOUTH AND SPORTS

J. Heyrovský Institute of Physical Chemistry

HR EXCELLENCE IN RESEARCH

Scientific Ethics and Integrity

- Female and Male Ombudspersons
- Committee for Scientific Work Ethics
- German Ombudsman for Ethics in Science is Member of our International Advisory Board

J. Heyrovský Institute of Physical Chemistry

HR EXCELLENCE IN RESEARCH

International Openness

J. Heyrovský Institute of Physical Chemistry

HR EXCELLENCE IN RESEARCH

International Openness
1/3 scientists are foreigners

- Open, Transparent and Merit-based recruitment
- Bilingual environment, manuals and guidelines

J. Heyrovský Institute of Physical Chemistry

International Openness

Collaboration with a Strong Partner on the Institutional Level

Helmholtz-Zentrum Dresden- Rossendorf (HZDR)

Signing Memorandum of Understanding with the Director of HZDR Prof. Roland Sauerbrey

http://www.avcr.cz/cs/veda-a-vyzkum/matematika-fyzika-a-informatika/Heyrovskeho-ustav-navazal-spolupraci-se-spickovym-Helmholtz-zentrum-Dresden/

J. Heyrovský Institute of Physical Chemistry

Giving Opportunities to Perspective Scientists

J. Heyrovský Young Scientist Position

“Carrier development scheme towards heading a department”

- **Scientific excellence**
- Younger than 35 years
- Extensive experience from aboard

After 5 years evaluation resulting in carrier recommendation

J. Heyrovský Young Scientists

Petr Kovaříček
Strasbourg
Berlin

Jaroslav Kočišek
Fribourg
Caen

Libor Veis
Budapest

Eva Pluhařová
Paris

Radek Šachl
Umea
Stochkolm

Viliam Kolivoška
Bern

Synthesis of nanomaterials and controlling its self-assembly

Dr. Petr Kovaříček,

Ph.D. from University of Strasbourg (France) with Jean-Marie Lehn

Post-doc at Humboldt University of Berlin (Germany)

Otto Wichterle Award 2019

L. Valenta, **P. Kovaříček**, V. Valeš, Z. Bastl, K. A. Drogowska, T. A. Verhagen, R. Cibulka, M. Kalbáč, Spatially Resolved Covalent Functionalization Patterns on Graphene, ***Angewandte Chemie International Edition***, 2019, 58, 1324-1328.

P. Kovaříček, M. Cebecauer, J. Neburková, J. Bartoň, M. Fridrichová, K. A. Drogowska, P. Cigler, J.-M. Lehn, M. Kalbáč, Proton-Gradient-Driven Oriented Motion of Nanodiamonds Grafted to Graphene by Dynamic Covalent Bonds, ***ACS Nano,*** 2018, 12, 7141-7147.

P. Kovaříček, D. J. van Dijken, S. P. Ihrig, S. Hecht, Acylhydrazones as Widely Tunable Photoswitches, ***J. Am. Chem. Soc.***, 2015, 137, 14982-14991.

A. Ciesielski, M. El Garah, S. Haar, **P. Kovaříček**; J.-M. Lehn, P. Samorì, P. Dynamic Covalent Chemistry of Bisimines at the Solid/Liquid Interface Monitored by Scanning Tunnelling Microscopy, ***Nat. Chem,*** 2014, 6, 1017-1023.

Development of novel optoelectronic detectors in an **one step** approach starting from functionalized graphene

Graphene, functionalization, on-surface polymerization of a semiconductor, 2D perovskite self-assembly, encapsulation, integration into a circuit

---

Result: Fully self-assembled optoelectronic detectors

J. Heyrovský Institute of Physical Chemistry

J. HEYROVSKY CHAIR

Highest Scientific Excellence

J. Heyrovský Institute of Physical Chemistry

J. HEYROVSKÝ CHAIR

ERA Chair at the J. Heyrovský Institute

Start of the action:	1. July 2018
Duration:	60 months
EU contribution:	2,483,750 €
Institute contribution:	500,000 €
Scientific Topic:	Catalysis

J. Heyrovský Chair project has received funding from the European Union´s Horizon 2020 research and innovation programme under grant agreement No 810310.

J. Heyrovský Institute of Physical Chemistry

J. HEYROVSKÝ CHAIR

J. Heyrovský Chair

Dr. habil. RNDr. Stefan Vajda, CSc.

“Scientific Excellence in Nanocatalysis”

- 2003-2018: Senior scientists at Argonne National Laboratories (USA Department of Energy)
- 1994-2002 Freie Universität Berlin; Habilitation
- Fulbright Scholar at The University of Chicago (1991-1992)
- PhD, Charles University (1990)

Since 1. January 2019 at the J. Heyrovský Institute

J. Heyrovský Institute of Physical Chemistry

J. HEYROVSKÝ CHAIR

J. Heyrovský Chair

Dr. habil. RNDr. Stefan Vajda, CSc.

“Scientific Excellence in Nanocatalysis”

- Demonstrated, for the first time, that size-selected subnanometer clusters can be stabilized and be highly efficient and selective catalysts
- Pioneered synchrotron based *in situ / operando* characterization of subnano clusters

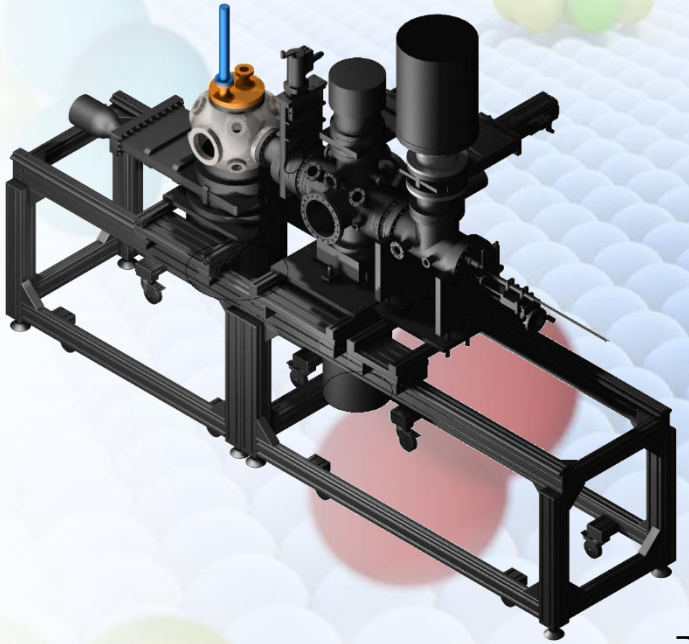
Y. Lei, …..and **S. Vajda**, Increased Silver Activity for Direct Propylene Epoxidation via Subnanometer Size Effects, **Science** 2010

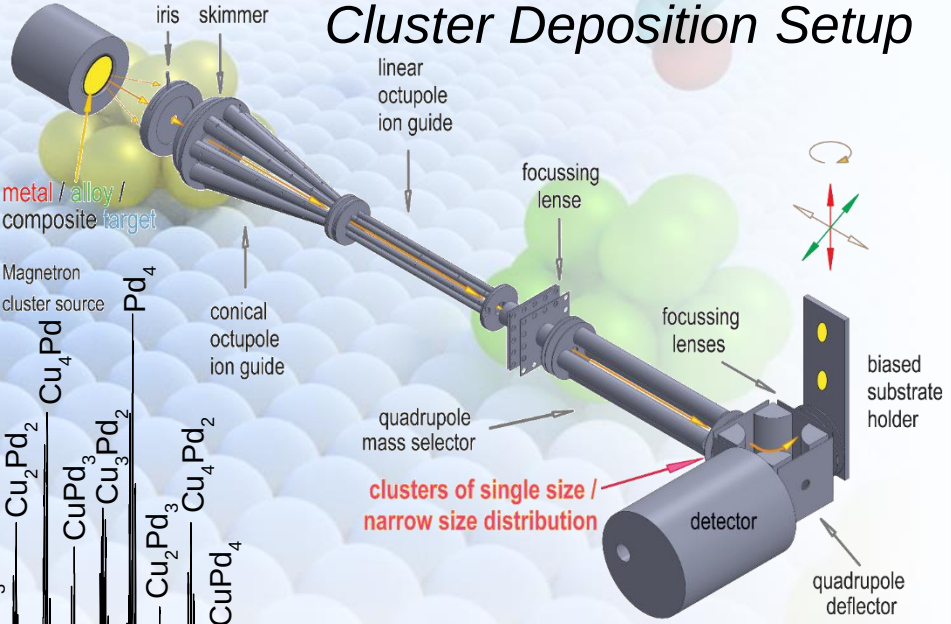
S. Lee, ……and **S. Vajda**, Subnanometer Cobalt Oxide Clusters as Selective Low Temperature Oxidative Dehydrogenation Catalysts, **Nat. Commun.** 2019

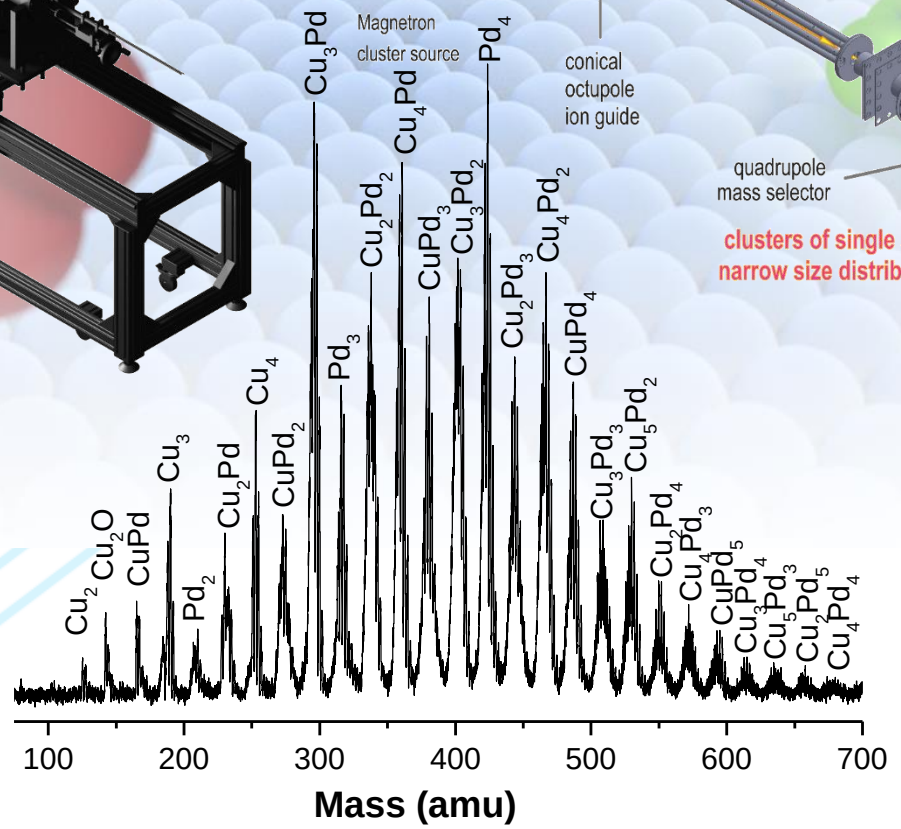
J. Heyrovský Chair

“Catalysis by size and composition selected subnanometer & nanometer clusters”

- Design of catalysts atom-by-atom







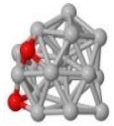
J. Heyrovský Chair

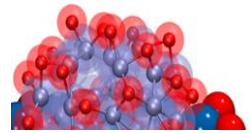
"Catalysis by size and composition selected subnanometer & nanometer clusters"

- **Goal:**
  Discovery of new classes of catalytic materials for industrial processes*
  based on bridging the gap from single atoms to nanometer

sub-nm clusters | **nanostructures assembled from clusters**

single component | multi-component | single component | multi-component



- **Economic Implications**
  Defined clusters made of a handful atoms of precious elements are
  -highly active
  -selective and
  INEXPENSIVE

* e.g. United States Patent 10,385,032 *Selective oxidation of propane to propylene oxide* 16/029,363

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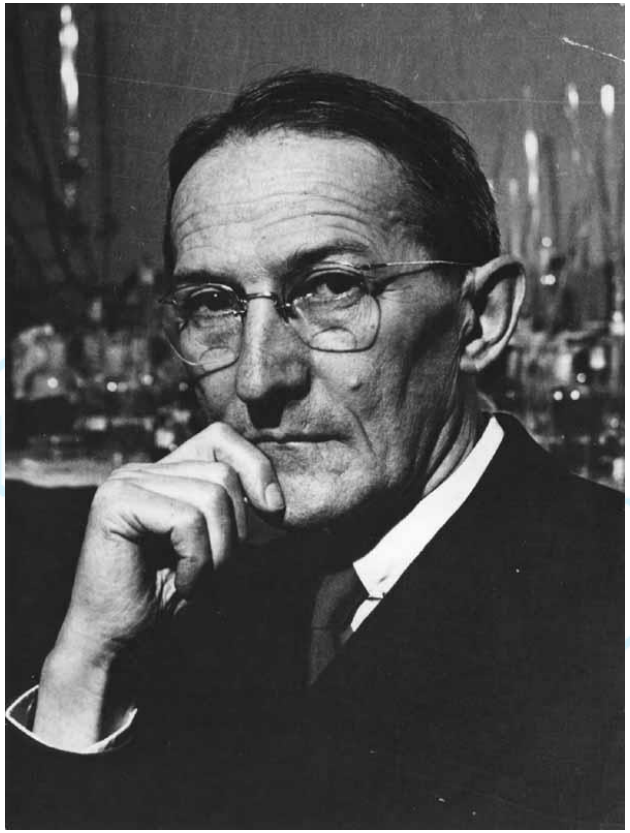

7.12.2019: Nanocatalysis lab moves from USA to Ladvi