

COST Info Day

6th November 2015

Diplomat Hotel Prague, Evropská 15,
Prague 6

My life with COST

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Outline

- History and present of my COST participation
- My national projects in frame of the COST Actions
- Scientific results / Publications
- Technological achievements / Patents, Constructions
- Work at the COST Management Committees
- Support of the MSMT CR
- Conclusions

History and present of my COST participation

Past

516 Tribology

(1998-2000)

523 Nano-structured Materials

(2003-2004)

P17 Electromagnetic Processing of Materials

(2008-2009)

MP0901 Designing Novel Materials for Nanodevices

(2010-2013)

Present

**OC-2015-1-19382 Multi-Functional Nano-Carbon
Composite Materials Network**

(2015-2019)

My national projects in frame of the COST Actions

516 Tribology

Wear Resistant Coatings with Low Friction Coefficient Prepared by Magnetrons and RF Plasma Chemical Systems with Hollow Cathodes

523 Nano-structured Materials

Nano-structured Magnetic Films Prepared by Plasma Jet Technique

P17 Electromagnetic Processing of Materials

Electromagnetic Processing of Nanostructured Materials Based on 3d Metals

MP0901 Designing Novel Materials for Nanodevices

Growth and Optimisation of Nanodiamond Thin Films for Applications to Biology, Medicine and Smart Bioelectronics

OC-2015-1-19382 Multi-Functional Nano-Carbon Composite Materials Network

Protection of Zirconium Alloys Surfaces in Nuclear Reactors by Polycrystalline Diamond Films

Scientific results / Publications

42 publications acknowledged to my COST projects, *the most cited:*

- [1] V. Petráková, F. Fendrych et al.: Luminescence of Nanodiamond Driven by Atomic Functionalization: Towards Novel Biomolecular Detection Principles, *Adv. Funct. Mater.* **22** (2012) 812-819. (IF=8.523)
- [2] F. Fendrych, L. Peksa, I. Kratochvílová, J. Vlček et al.: Growth and characterization of nanodiamond layers prepared using the plasma-enhanced linear antennas microwave CVD system; *Journal of Physics D: Applied Physics* **43** (2010) 374018 (6pp). (IF=2.215)
- [3] F. Fendrych, L. Soukup et al.: Cu_3N films prepared by the low-pressure RF supersonic plasma jet reactor: Structure and optical properties; *Diamond and Related Materials* **8** (1999) 1715-1719.
- [4] M. Kopeček, L. Bačáková, F. Fendrych, M. Nesládek et al.: Improved adhesion, growth and maturation of human bone-derived cells on nanocrystalline diamond films, *Physica Status Solidi A* (2008) –Applications and Materials Science, Volume: **205**, Issue: 9, Pages: 2146-2153.
- [5] O. Životský, F. Fendrych et al.: Soft magnetic properties of as-deposited FeCoAlN films studied using magneto-optic magnetometry; *Journal of Magnetism and Magnetic Materials* **316** (2007) e858-e861.

Technological achievements / Patents

2 patents created in frame of my COST projects: :

[1] **International Patent** (accepted 26th March 2015):

PCT/CZ2014/000101 - **WO2015/039**

Title of invention: **LAYER PROTECTION THE SURFACE OF ZIRCONIUM ALLOYS USED IN NUCLEAR REACTORS.**

Patent Number: WO2015039636-A1; CZ201300727-A3; CZ305059-B6

Patent Assignee: UNIV CZECH TECH PRAGUE FACULTY ELECTR; ACAD SCI CZECH REPUBLIC INST PHYSICS; CESKE VYSOKE UCENI TECH PRAZE FAKULTA; CESKE VYSOKE UCENI TECH V PRAZE FAKULTA; FYZIKALNI USTAV AVCR VVI

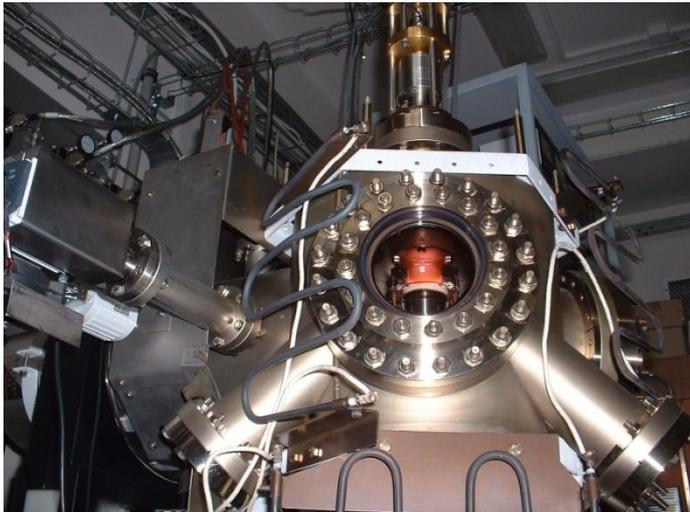
Inventor(s): SKODA R; SKAROHLID J; KRATOCHVILOVA I; FENDRYCH F; TAYLOR A; (cooperation with **Westinghouse Electric Co.**)

[2] **Czech Patent 305059-2013**: Layer protecting the surface of zirconium alloys used in nuclear reactors.

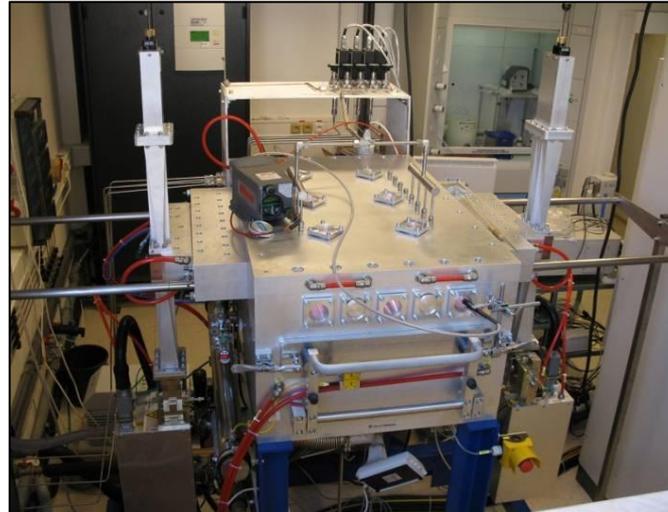
Technological achievements / Constructions

2 originally constructed apparatuses in frame of the COST projects:

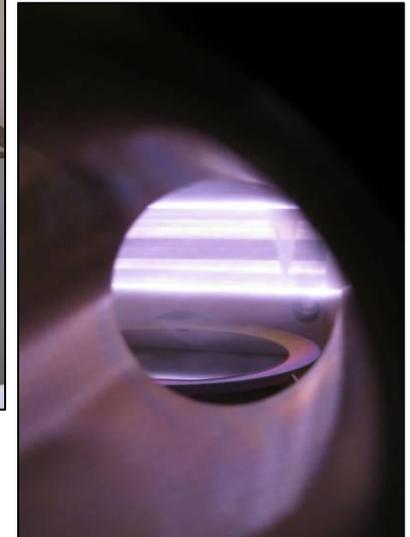
- [1] UHV Plasma Jet with Hollow Cathode Discharge
- [2] MicroWave Plasma-Enhanced CVD with Linear Antennas



[1]



[2]



Work at the COST Management Committees

Past

516 Tribology

FR leader, 19 countries

523 Nano-structured Materials

CH leader, 24 countries

P17 Electromagnetic Processing of Materials

UK leader, 19 countries

MP0901 Designing Novel Materials for Nanodevices

FR leader, 22 countries

New

OC-2015-1-19382 Multi-Functional Nano-Carbon Composite Materials Network

DE leader, 16 countries

Substantial increasing of cooperation quality !

Support of the Ministry of Education, Youth and Sports of the Czech Republic (MSMT CR)

Past COST 516, 523, P17, MP0901

- Financial support of the national project involved in relevant COST Action was max. 500 kCZK (=18.5 kEUR) / year (for physics, chemistry, but for medicine it was max. 750 kCZK).
- Practically always one year delay with national project funding after beginning of the COST Action.
- Suitable for salaries, small investment, material, consumables, travel expenses, incl. standard overheads 20% for institution.

New OC-2015-1-19382

- financial support max. 750 kCZK (=28.0 kEUR) / year, for physics, too.

Conclusions

COST Actions

are very useful for scientific knowledge exchange, cooperation, special measurements, seminars, conferences, workshops, PhD students education, **BUT** for novel labs or apparatuses building, expensive devices purchase, etc. it is always necessary to find additional grants (EU FP7, Horizon 2020, national GACR, TACR, MPO,...) or institutional funding. Based on my long time experience – communication and cooperation with **COST MC** and **MSMT CR** are excellent.