TCP on Fusion Materials (FM TCP)

The scope of the FM TCP covers materials needed to meet the requirements of structural, thermal management, fuel breeding and processing, and neutron economy of fusion systems. Relevance and application of the results of this work range from meeting the needs of existing plasma physics devices, through International Thermonuclear Experimental Reactor (ITER), and DEMO* stages of fusion development, to the application of advanced materials in fully mature fusion power plants serving the base energy needs of society.

Main areas of work

- Beryllium technology
- Materials theory and modelling
- Silicon carbide composites
- Tungsten alloys
- Irradiation facilities and testing
- Radiation effects in ceramic insulators
- Reduced activation ferritic/martensitic steels
- Vanadium alloys

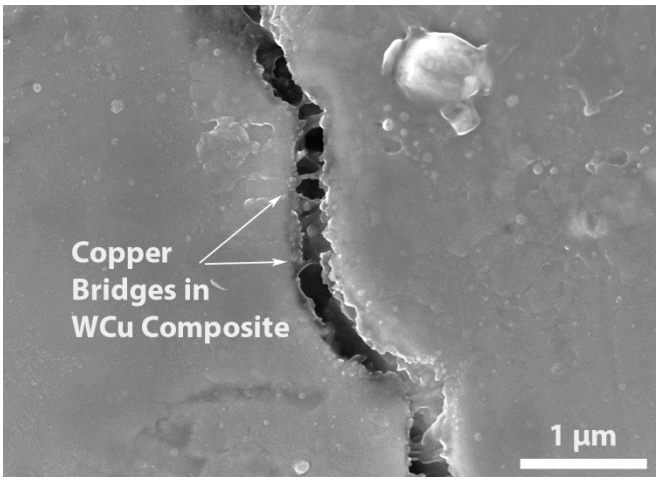
Key activities and accomplishments (2017-2018)

- **Materials theory and modelling**: a planning meeting was held on 11 March 2018 in conjunction with the Minerals, Metals & Materials 2018 Annual Meeting and Exhibition in Arizona, USA
- **Radiation effects in ceramic insulators**: the 27th Workshop on Radiation Effects in Ceramic Insulators was held on 20 September 2018 on the margins of the SOFT-30 conference

Priorities and projects (2019 – 2020)

- **Beryllium technology**: the next workshop will be held prior to the 19th International Conference on Fusion Reactor Materials (ICFRM-19) in Los Angeles, California, USA
- **Materials theory and modelling**: Detailed planning is underway for an invitation-only workshop to enable selected participation by FM TCP members and to allow for focused discussions, with the goal of producing a technical journal paper to document the proceedings. The next workshop is scheduled for 24-26 June 20149 in Walla Walla, Washington, USA
- **Radiation effects in ceramic insulators**: The next workshop will be held in conjunction with the 14th International Symposium on Nuclear Technology in Budapest, Hungary, 22-27 September 2019 or in conjunction with the 2020 SOFT conference.
- **Reduced activation ferritic and martensitic steels, vanadium alloys, and tungsten alloys**: the next meetings are planned on the margins of ICFRM-19, 27 October – 1 November 2019 in California, USA

** DEMO is a proposed nuclear fusion power station that is intended to build upon the ITER experimental nuclear fusion reactor.*



Ductile copper "bridges" form across cracks in tungsten-copper (WCu) composites providing greater resistance to fracture in otherwise brittle tungsten materials. Development of fracture resistant tungsten materials is critical for successful fusion power development. (Photo courtesy of C.H. Henager, Jr., Pacific Northwest National Laboratory).

Multilateral collaborations

- The European Union is organising a multilateral collaboration on the effects of neutron irradiation on tungsten base materials for high-heat load application. The FM TCP periodically exchanges information on current activities with the TCP on Nuclear Technology of Fusion Reactors (NTFR TCP), and the TCP on Environment, Safety, and Economics Aspects of Fusion Power (ESEFP TCP). Going forward, further exchanges with the TCP on Plasma Wall Interaction (PWI TCP) would be beneficial.

Fusion Power

Membership

Canada, China, India, Japan, Korea, Russia, United States, European Commission

Why should your organisation become a member of the FM TCP?

The FM TCP aims to achieve the broader goals of developing the materials needed to allow fusion to reach its full potential as a safe, economical and environmentally attractive energy source. Activities of the FM TCP enhance the co-operation and collaboration of the parties interested in understanding the behaviour and development of materials for a fusion power system environment.

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