Innovative material for heat sinks / renowned prize of the European Commission Dr. Alexander von Müller from Max Planck Institute for Plasma Physics (IPP) in Garching was awarded third place of the "SOFT Innovation Prize" of the European Commission at the Symposium on Fusion Technology, SOFT 2020 for short, for his contribution on a novel material for highly resilient heat sinks – copper reinforced with interlaced tungsten fibres.

The composite materials developed by Alexander von Müller and cooperation partners are designed to act as water-cooled heat sinks to protect particularly stressed areas of the plasma vessel in a future fusion power plant – the areas where the hot plasma, magnetically suspended in front of the walls, comes into contact with the vessel.

Today, cooling tubes made of copper alloys with good thermal conductivity are used for this purpose, covered with robust tungsten plates, the metal with the highest melting point. However, copper alloys cannot cope with the high heat and neutron loads expected in a fusion power plant. Tungsten fibre-reinforced copper composite materials offer a promising alternative. For production, hair-fine fibres of tungsten are braided and impregnated with liquefied copper at 1200 degrees. Tests under high thermal stress confirmed the performance of these composite materials, which combine high strength and good heat conductivity. The award winners praise their suitability for other applications where similar material properties are required.

The European Commission awards the Prize for Innovation in Fusion Technology to outstanding researchers in science or industry for innovative ideas and solutions. The 12,500 euro prize was awarded to Alexander von Müller on September 21 during the virtual SOFT conference. The Symposium on Fusion Technology, which will run from September 20 to 25, 2020, was originally planned in Dubrovnik, Croatia.

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The hair-thin fibers of tungsten, around 150 micrometers thick, are braided (left) and impregnated with molten copper to produce the composite material. Right: Under the microscope, the fine tungsten fibers can be seen in the copper matrix.