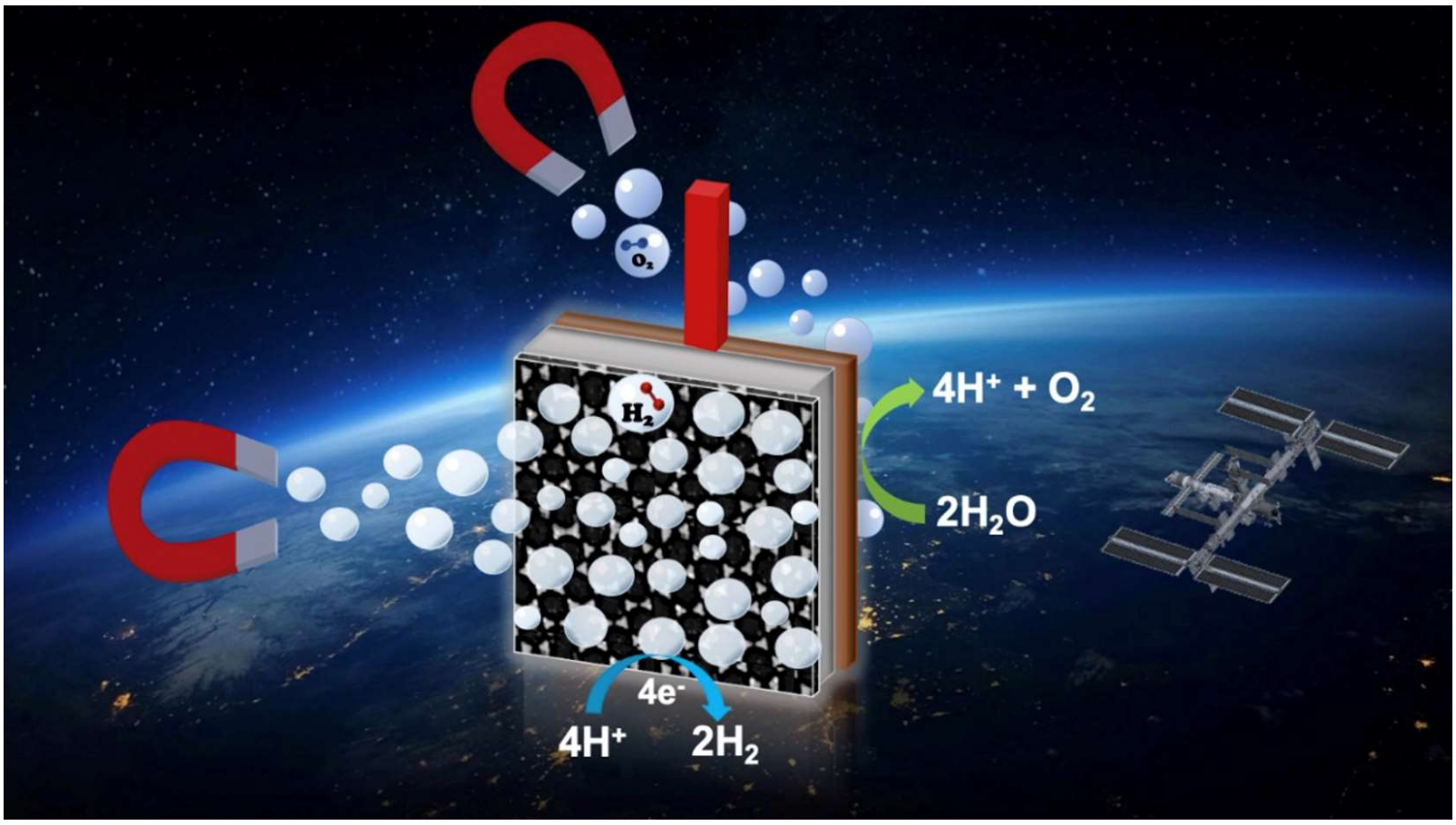
# Fluids and Space Engineering Seminar

Date: Thursday, December 14, 2023 at 14:15 h
Location: ZARM, Room 1730

## ***Photoelectrochemical Devices for Space Applications***

**Dr. Katharina Brinkert**

University of Bremen, Center of Applied Space Technology and Microgravity (ZARM)
University of Warwick, Department of Chemistry, UK




Human deep space exploration will rely on efficient and sustainable life support systems for the production of oxygen and other chemicals as well as the recycling of carbon dioxide. Photoelectrochemical (PEC) devices are investigated for the light-assisted production of hydrogen and carbon-based fuels from CO2 within the green energy transition on Earth.1 Similarly to natural photosynthesis, they only require water and solar energy for the process and release oxygen as a by-product. Their monolithic, compact design comprising integrated semiconductor-electrocatalyst systems for light absorption, charge separation and catalysis as well as their sole reliance on solar energy makes them attractive for applications in space, where they can directly convert solar into chemical energy without requiring additional accessories.2,3

This talk highlights our recent experiments with PEC devices in microgravity environments realised for 9.3 s at the Bremen Drop Tower and links results regarding device efficiencies to gas bubble management4 and optoelectronic simulations5. We will discuss obstacles such as the limiting solar irradiance on Mars as well as the reduced gravitation on the Martian and lunar surface for the application of PEC and other electrochemical devices in these environments and point to practical, sustainable solutions how to overcome them.