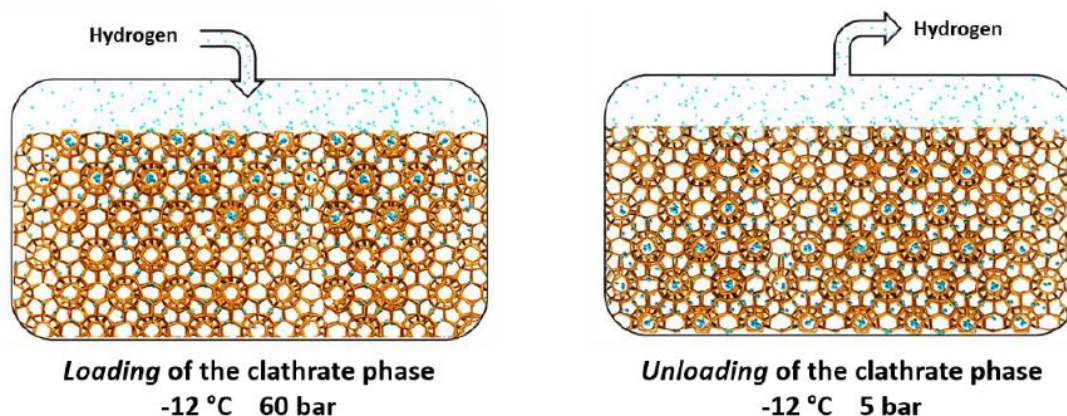


Abstract ARCLATH-2

Artificial clathrates for safe storage, transport and delivery of hydrogen II, full cSBO with a proposed starting date on 1 July 2021 and a proposed duration of 30 months, with partners KU Leuven, UGent, UAntwerpen and VUB. Follow-up project of the currently running Moonshot sprint cSBO project ARCLATH (<https://moonshotflanders.be/mot4-arclath/>).

Storing and transporting hydrogen is an essential aspect of the energy transition. Currently, stationary storage as well as transportation is mostly done using pressure vessels at 200-700 bar, or liquefaction at -253°C . We propose vessels filled with artificial hydrogen clathrates (ARCLATH) having similar storage capacity but requiring less pressure (<100 bar) and near ambient temperatures ($> 13^{\circ}\text{C}$). In ARCLATH hydrogen molecules are stored in solid form by encapsulating them individually in hydrate capsules ("hydrogen ice"). Loading and unloading is envisioned as a simple process of pressurization and depressurization the clathrate container. ARCLATH technology is expected to be suited at all scales (from cylinders to tanker ships). The envisaged ARCLATH storage conditions will reduce potential safety hazards associated with high-pressure hydrogen vessels, making hydrogen technology more accessible and promoting public acceptance. ARCLATH has a lower CO_2 footprint compared to liquefaction, compression and other emerging technologies like LOHC based on CAPEX (vessels operated at < 100 bar and $T > 13^{\circ}\text{C}$) and OPEX (low energy consumption). Based on these competitive advantages ARCLATH technology is expected to easily penetrate the hydrogen storage market.



For substantive questions about this project proposal, please contact MOT4 representative Jeroen van Walsem (jvanwalsem@catalisti.be; +32 497 731 175).