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Water production from lunar regolith through carbothermal reduction modelling through ground experiments

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Space exploration is going to play a relevant role within the just started decade, with the Moon at its centre. Many activities are on going to enhance science of/on and from the Moon and to develop the fundamental technology to accomplish the challenging objectives the foreseen missions to our satellite need. Among those the capability to detect, extract and manipulate the in situ resources is central for humans back on the surface and more. Politecnico di Milano, thanks to the activities started under the cap of an ESA study, developed in consortium with OHB-I and OHB-S, implemented a laboratory plant and run experiments to assess and tune the carbothermal reduction process on NU-LHT 2M in extracting oxygen from feedstock oxides. The experiments were successful and water has been produced, as expected.

To accurately understand the process and address the technology for a flight test the numerical modelling of the whole process steps has been settled and a comprehensive characterisation of the feedstock simulant was performed as well. Results are presented and critically discussed.

The paper will go through the simulant characterisation approach and results, the process description and modelling, the lab plant description and the experimental test campaign results, obtained with the implemented plant.