

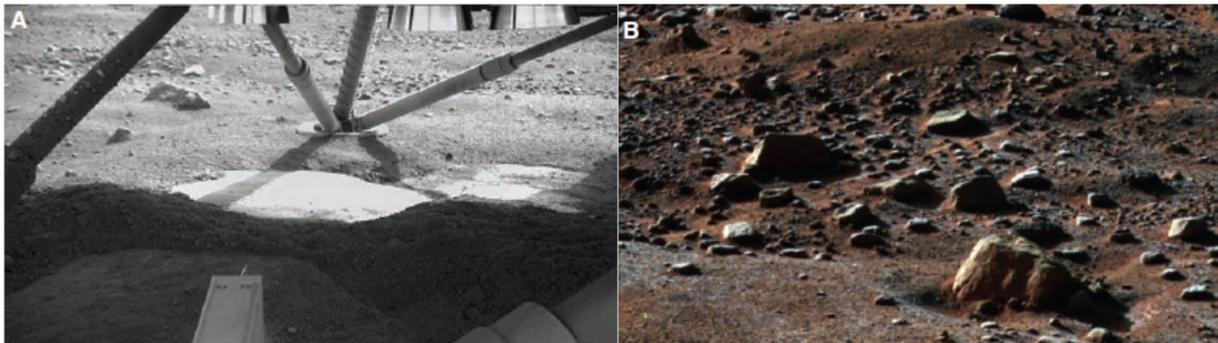
**Abschlussarbeit Bachelor/Master:
Research on the production of high density advanced ceramics on Mars using additive
manufacturing**

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Sprache: English / German

Recently, there has been great enthusiasm for the use of additive manufacturing technologies in space exploration. In 2014 NASA flew a fused deposition modelling device to the International Space Station. The machine was used to demonstrate the printing of a ready-to-use tool with a design file transmitted from earth [1], showing the potential of on-demand production in space using raw materials brought from earth.

Space agencies are working on deep space exploration, such as a human journey to Mars. In order to facilitate such endeavours, researchers have proposed the use of remotely controlled additive manufacturing technologies coupled with in-situ resource utilization (ISRU). ISRU is the collection, processing, storing and use of materials encountered in the course of human or robotic space exploration, replacing materials that would otherwise have to be brought from Earth [2].



(A) An image taken during the Phoenix mission (2008) by the RA camera pointed under the lander, showing the ice table exposed by the thrusters. **(B)** Night-time image of Mars surface frost from sol 80 ($L_s = 113^\circ$) [3].

The obvious choice for employing ISRU on extra-terrestrial bodies such as the Moon or Mars, would be to make use of readily available surface materials. Through various space missions there is an ever-growing array of knowledge on surface mineralogy, especially for the Moon and to a lesser extent for Mars. In general, materials found on the Moon and Mars have oxidic character, making the processing of such oxides a viable research opportunity for Ceramic and Glass Scientists and Engineers.

In this Forschungslabor you will work in a joined project with researches form TU Berlin and Bundesanstalt für Materialforschung und –prüfung (BAM) focusing on the additive manufacturing of mars-like soils into high density advanced ceramics. Your part will focus on the pre-preparation of materials from NASA’s Johnson Space Center in Houston making them ready for two different ceramic additive manufacturing technologies.

From this project you will gather first-hand experience into the principles of competing ceramic manufacturing technologies, working with researchers at BAM who are leading experts in this field.

Arbeitsinhalte/ work content ceramic processing // characterization // additive manufacturing (3D printing)

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Quellenverzeichnis

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