Mars has near ideal conditions to create oxygen from atmospheric CO2, says study

This breathtaking colour photo of the surface of Mars unveiled by NASA is the sharpest photograph ever taken on the surface of Mars. The picture was taken by the panoramic camera on the Mars Exploration Rover Spirit. | Photo Credit: AP

Mars has near ideal conditions for efficiently creating oxygen from atmospheric carbon dioxide in the future using plasma technology, a study has found.

According to researchers from University of Porto in Portugal and Ecole Polytechnique in Paris, Mars has 96 per cent carbon dioxide (CO2) in its atmosphere.

The research, published in the journal *Plasma Sources Science and Technology*, shows that the pressure and temperature ranges in the Martian atmosphere mean non-thermal plasma can be used to produce oxygen efficiently.

“Sending a manned mission to Mars is one of the next major steps in our exploration of space. Creating a breathable environment, however, is a substantial challenge,” said Vasco Guerra, from the University of Lisbon in Portugal.

“Plasma reforming of CO2 on Earth is a growing field of research, prompted by the problems of climate change and production of solar fuels,” said Guerra.

“Low temperature plasmas are one of the best media for CO2 decomposition — the split-up of the molecule into oxygen and carbon monoxide — both by direct electron impact, and by transferring electron energy into vibrational excitation,” he said.

Mars has excellent conditions for In-Situ Resource Utilisation (ISRU) by plasma.

As well as its CO2 atmosphere, the cold surrounding atmosphere may induce a stronger vibrational effect than that achievable on Earth.

The low atmospheric temperature also works to slow the reaction, giving additional time for the separation of molecules.

“The low temperature plasma decomposition method offers a twofold solution for a manned mission to Mars. Not only would it provide a stable, reliable supply of oxygen, but as source of fuel as well, as carbon monoxide has been proposed as to be used as a propellant mixture in rocket vehicles,” said Guerra.

“This ISRU approach could help significantly simplify the logistics of a mission to Mars. It would allow for increased self-sufficiency, reduce the risks to the crew, and reduce costs by requiring fewer vehicles to carry out the mission,” he said.

A study of nearly 300 people living in different parts of India found that nine single-base variants (single-nucleotide polymorphisms or SNPs) account

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