"Our study provides a demonstration that an advanced AI chemist can, without human intervention, synthesize OER catalysts on Mars from local ores," the researchers wrote in the study.

The first step in extracting the oxygen involves sending samples of the meteor to a facility to be analyzed in a fully automated lab. After that, the robot pretreats the ore — removing unwanted impurities and materials. It then uses materials within the meteor to create a catalyst — a process called catalytic synthesis — which it tests in electrochemical performance testing.

The type of catalyst it can produce with the available resources, and work most efficiently to extract oxygen, can vary massively, so selecting the right one is a vital step. This is where the AI chemist comes in.

The computational module on board the robot — dubbed the "computational brain" — combines machine learning algorithms with theoretical models to analyze both the robot-acquired experimental data and massive simulation data.