Wednesday's lunar landing could well be a take-off point for India's future missions to inhabit Moon and use it as a launchpad for interplanetary missions

NOW LET'S BUILD ON MOON

MOON IN SCI-FI & MOVIES

Landing on moon has long figured in literature and movies

FROM THE EARTH TO THE MOON

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Now that Isro has landed a spacecraft on Moon, will India look at occupying Moon? If some of the cutting-edge research being done in the country is any indicator, we may go far beyond that in future and look at building structures to live in. Long-term occupation of Moon, as the US's Artemis mission envisages, is but a natural step to use the lunar surface as a launchpad for interplanetary exploration.

A former Isro engineer, whose work on lunar soil simulant (LSS) started at the Lunar Terrain Test Facility (LTTF) of Isro Spacecraft Integration Test Establishment (Isite) began in 2011, is ready with five designs for structures on Moon. Another scientist and his team at IISc have developed 'space bricks' using LSS. When India embarks on its unmanned Gaganyaan, on board will be a type of bacteria that the IISc team used as an adhesive to make the bricks.

LSS has been found to match the lunar soil up to 99.6% when tested with samples brought back from Moon by Nasa's Apollo missions. A patent has helped Isro manufacture 60 tonnes of this simulant (called 'LSS-ISAC-1' as per the patent) at ₹10 lakh; purchasing it would have cost several crores of rupees. Senior scientist I Venugopal, who led the LSS project, told TOI: "No other country would have given us so many tonnes. Today, as multiple countries are looking at a more sustained presence on Moon, the need for such structures will arise for which you'll need structures there. And we have done the groundwork."

Pics: SL Shanth Kumar & Pravin Barnale

ON CLOUD NINE: Visitors at Nehru Science Centre, Mumbai celebrate Isro's Moon landing

Once the 'soil' was ready, an IISc team led by professor Aloke Kumar started researching on how to 'grow' bricks using LSS. They used a process called microbial induced calcite precipitation, wherein, in the right conditions, bacteria can precipitate calcium carbonate. Then the team used 'guar gum', a naturally occurring polymer, as an additive. "The results were fantastic," said Kumar. "The brick exhibited a tenfold increase in strength."

VIKRAM KEEPS DATE WITH MOON

If tests to build strong structures using LSS bricks prove successful, future missions would be able to replicate the process using lunar soil which comes close to the simulant. "At our lab, we've been working on scientific problems related to long-term space habitability. Space bricks is one such endeavour. We should plan for space colonies on Moon and Mars," Kumar told TOI.

Can this bacteria function in the same manner in the lunar environment? "All organisms change their behaviour with varying conditions. In order to further test the promise of this technology in extra-terrestrial conditions, it is essential to carry out tests in low-gravity conditions. And that's what Gaganyaan plans to do."