
Enabling Human Exploration through Materials Innovation

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Space exploration presents unique challenges that demand advanced materials capable of withstanding extreme environments, supporting human habitability, and enabling in-situ resource utilization (ISRU). This presentation highlights the UAE's MAD (Materials Adhesion/Abrasion Detection) program implemented in the Emirates Lunar Missions, led by the Mohammed Bin Rashid Space Centre (MBRSC). MAD investigates the behavior of advanced materials in the lunar environment. These investigations would support ISRU strategies, where local materials are used for construction and life support, reducing reliance on Earth-based resources. The talk will emphasize the importance of interdisciplinary collaboration between planetary science and materials engineering, and how surface testing of materials to assess their durability, abrasion resistance, and suitability informs the development of novel materials for future exploration architectures including habitat construction, mobility systems, and life-support technologies.
