

## Special session proposal for IJCIEOM 2025 conference SPS1

**1. Session title:** Advancements and Opportunities for In-Space Manufacturing

**2. Session objectives:**

The Earth is a finite ground, capable to provide a wide set of raw materials but with well-known characteristics and in most cases in limited quantities. Human being are coping with important mega trends (i.e., population growth, urbanization, indiscriminate exploitation of finite natural resources, pollution generation), compelling them to expand this field of action. This session aims to explore the advancements and technical research in in-space manufacturing, highlighting the entire lifecycle from waste collection and processing of decommissioned satellites to the final deployment of manufactured products. By emphasizing sustainable practices and circular economy principles, we seek to address critical challenges in recycling and repurposing space debris. Specific objectives include:

1. Present the latest technologies in waste collection, sorting, and processing to transform space junk into valuable resources.
2. Discuss breakthroughs in smelting and melting technologies that facilitate on-site material transformation to produce new parts.
3. Evaluate state-of-the-art production and finishing technologies that enhance the quality and scalability of in-space manufacturing.
4. Analyze energy requirements and lifecycle analysis for sustainable practices, ensuring that in-space manufacturing aligns with environmental goals.
5. Share insights on effective deployment methods to utilize manufactured products in space exploration initiatives.

Fostering interdisciplinary collaboration, this session will provide researchers and industry professionals with the knowledge and insights necessary to advance in-space manufacturing sustainably and circularly.

**3. Organizer(s):**

(Name, affiliation, email address)

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