ReUse in Space: Waste Recycling on Interplanetar Stations

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Efficiency and resourcefulness are fundamental to all space missions due to an association to high costs and limited resources. Currently, however, products which are no longer required on the International Space Station are considered waste and stowed in transporters, in preparation to be burned up in the upper earth atmosphere during re-entry. This isn't only a destruction of valuable material, it also destroys resources and energy, as every product in space is acquired there at high cost. Increase of space debris has also become a critical issue and together, these concerns ask the question; "Why not recycle in space?". Recycling is a common process on earth, however, on board the ISS, efforts in recycling don’t go beyond those providing life-sustaining substances, such as water and oxygen. With increasing space missions, delving deeper into extraterrestrial space, it's now essential to think about recycling products in space. Together with recent advances in 3D printing recycling in space has become more feasible than at first thought. Inspired by this unique issue, this project has analyzed the type of waste produced on board the ISS, identified recyclable materials and tested the technical feasibility for reusing these materials. As a result, a new method has been developed that allows PE-LD foam (used to package experiments and payloads), to be processed in orbit, so that the material can directly print with granules extruders of 3D printers for first time. In the realms of this project, successfully producing first print samples.

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