Overview of Kibo experiment candidates for around 2012

1. Experiment Title
   Quantitative Description of Gravity Impact on Solid Material Flammability as a Base of Fire Safety in Space

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3. Outline of Experiment
   NASA’s material flammability tests for fire safety in space are attained in normal gravity, while it is known that the material flammability could be higher in microgravity in some conditions. Therefore, it is important to understand the impact of gravity presence on material flammability. In the present research, two types of solid material, polyethylene insulated wire and flat plastic sheet are selected as test samples and their flammability regarding two fundamental processes of solid combustion, that is, (1) solid material ignition, and (2) flame spread over solid material, will be quantitatively determined in microgravity. Then, the discussion on the discrepancy between the data in normal and micro gravity will be made to give the validity of NASA’s material flammability tests. Further, the “material flammability map” in long-term microgravity environment for the selected samples will be given as a fire safety data base in space, which could be reference data to estimate flammability of other solid materials having similar geometrical configuration.

![Ignition map of overloaded wire](image1)

**Fig. 1** Ignition map of overloaded wire
Region 1: Ignition limit in 1G
Region 2: Ignition limit in short-term \(\mu\)G tests.
Region 3: Ignition limit in long-term \(\mu\)G tests.
Region 4: Ignition but no sustained flame.

![Flammability map of spreading flame](image2)

**Fig. 2** Flammability map of spreading flame
LOI: Low oxygen index, minimum O2 concentration to sustain flame spreading.