

## Study on Material Design of Hardened Materials Using Hemicellulose as Binder



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In recent years, the depletion of natural resources and the reduction of their use have become international issues, and alternative materials are being considered. In addition, the Artemis manned lunar exploration project has stimulated the development of building materials for constructing a lunar base worldwide. One of the challenges of constructing a lunar base is that the environment is very different from Earth's and that it is challenging to procure construction materials. Therefore, it is necessary to develop construction materials that can be procured locally. In this study, it investigated the development of concrete that can be constructed on the lunar surface, and that can cope with the depletion of resources and the reduction in the number of materials used. As a material, it focused on plants, which may be grown on the Moon to secure food, and used hemicellulose, a type of plant-derived cell, as a binder. It also used simulated lunar sand as the aggregate material, focusing on lunar sand on the lunar surface. Two types of hemicelluloses, xylan and glucomannan, were examined. As a result, the hardened material using xylan is sensitive to humidity and high-temperature and is considered difficult to use as a construction material on the Moon. Glucomannan was examined as an alternative to xylan, and high-temperature resistance was obtained. On the other hand, under low-temperature conditions, the water remaining inside the specimens froze, which reduced their strengths.

### Biography:

Ayane Yui is a graduate student at Ritsumeikan University, working on research related to concrete and materials.