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HIGH-TEMPERATURE MATERIALS RESEARCH RACK IN CHINESE SPACE STATION

Abstract

Supported by Chinese Manned Space Program, one experimental facility named “High-Temperature Materials Research Rack (HTMR)” is developed for materials research in microgravity. In this paper, a brief description of this facility will be given. The core of HTMR is a four-heating-zone furnace designed for materials processing. It can be heated up to 1600 centigrade. Totally 16 sample cartridges with the diameter of 26mm and 380mm in length can be automatically and accurately exchanged by the sample management assembly in this system. Based on this feature, it can cover as wider as possible the different kinds of materials by changing the furnace to adapt the materials processing demands. The maximum processing length of the sample is 160mm. Directional solidification can be carried out by moving the heating zone along the axial direction, with the moving rate ranging from 0.5 to 200mm/h. The maximum power input is less than 1000W. In addition, the solidifying process can be visualized with X-ray radiography method by one special module of this system. This facility is now serving in space for materials experiments in Chinese Space Station since 31 October 2022. Up to now, totally more than 10 experiments have been carried out in microgravity in this facility.