

## **Superconducting receiver technologies supporting ALMA and future prospects**

The Atacama Large Millimeter/submillimeter Array (ALMA) is the largest ground-based radio telescope and has been constructed in the Atacama Desert in Chile at an altitude of about 5,000 m, as an international collaboration project involving East Asia, Europe, and North America in cooperation with Chile. This paper briefly introduces the telescope, and describes the development of the ALMA Band 10 (0.79-0.95 THz) receiver, which covers the highest frequency band in ALMA and is recognized as the most difficult in terms of superconducting technology. The development started in 2005, and the manufacturing/testing of all the receivers to be installed in a total of 66 Cassegrain reflector antennas that compose ALMA was completed in 2013. One of the key developments to meet the stringent ALMA requirements was Band 10 superconductor-insulator-superconductor (SIS) mixers with high quality superconducting NbTiN films. After the ALMA construction, NAOJ has started development studies and projects for ALMA enhancement according to top-level science requirements, which will be also presented.