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Thin semi-rigid coaxial cables for cryogenics applications AKIHIRO KUSHINO, Asahikawa National College of Technology, SOICHI KASAI, COAX CO., LTD. — We have developed cryogenic coaxial cables for low temperature signal readout from sensitive devices, such as transition edge sensors, superconducting tunnel junctions, and kinetic inductance detectors. In order to reduce heat penetration into cryogenic stages, low thermal conductivity metals were chosen for both center and outer electrical conductors. Various types of coaxial cables, employing stainless-steel, cupro-nickel, brass, beryllium-copper, phosphor-bronze, niobium, and niobium-titanium, were manufactured using drawing dies. Thermal and electrical properties were investigated between 1 and 8 K. Coaxial cables made of copper alloys showed thermal conductance roughly consistent with literature, meanwhile Nb coaxial cable must be affected by the drawing process and thermal conductance was lowered. Attenuation of superconducting Nb and NbTi coaxial cables were observed to be adequately small up to above 10 GHz compared to those of normal conducting coaxial cables, which are subject to the Wiedemann-Franz law. We also measured normal conducting coaxial cables with silver-plated center conductors to improve high frequency performance.

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