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Title: Micro Far-Infrared Reflectivity of CaNb2O6 Single Crystal Fibers Grown by the Laser-Heated Pedestal Growth Technique
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Abstract: CaNb2O6 single crystal fibers were grown by the laser-heated pedestal growth technique, directly from the starting reagents. Optically transparent fibers were obtained in the form of rods with elliptical cross-section, free from cracks, impurities, and secondary phases, with an average diameter of 0.4 mm and about 20 mm of length. The fibers grew within the orthorhombic Pbcn columbite structure, with the growth axis nearly parallel to the crystallographic a-direction. The parameters b and c were parallel to the shorter and larger ellipsis axes. A special setup using a microscope was developed to obtain the far-infrared reflectivity spectra of these micrometer-sized fibers, allowing the identification and assignment of 34 of the 38 polar phonons foreseen for the material. From these phonons, the intrinsic dielectric constant (<εr> = 18.2) and quality factor (<Qu × f > of 185 THz) could be estimated, showing the potential of the material for applications in microwave circuitry. These results, along with previous polarized Raman data (Cryst. Growth Des. 2010, 10, 1569), allow us to present a comprehensive set of optical phonon modes and to discuss the potential use of designed CaNb2O6 microcrystals in compact optical devices.