Preparation and EPR study of floating zone grown Ca$_2$FeMoO$_6$ crystal

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Polycrystalline Ca$_2$FeMoO$_6$ is a double perovskite that exhibits increase of magnetoresistance from 16.7% to 44.2% between 4 K and 300K at a magnetic field of 7 T. This increase is larger than that of Sr$_2$FeMoO$_6$ ($T_C = 420$ K) at the same corresponding extreme temperatures and applied magnetic field. This makes Ca$_2$FeMoO$_6$ attractive enough for immediate colossal magnetoresistance-related applications, and availability of their single crystals is not only useful but convenient to better study their magnetotransport properties. In this work, we report on the use of a floating zone technique to grow crystalline quality Ca$_2$FeMoO$_6$ crystal mini-rods that has been studied at room temperature by electron paramagnetic resonance at 9.4 GHz. The crystals were grown in isostatic inert atmosphere (ultrapure N$_2$) at a specific pressure range (0.25-0.50 atm) and unreacted starting reagents were used. The measured resonance line fits a gaussian function with linewidth of about 1800 G, and resonance field of 3500 G, typical of predominant presence of Fe$^{2+}$ ions, in agreement with expected valence of iron in the compound. Additional measurements of d.c. magnetization properties as a function of temperature (2 K - 400 K range) and magnetic field ($H_{max} = 7$ T) are currently being carried out.