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Optical investigation of low-dimensional purple and blue bronzes (G)

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The molybdenum oxide bronzes are a family of low-dimensional materials exhibiting interesting behavior including superconductivity, charge-density wave states, and metal-insulator transitions. After considerable study, there is still no firm consensus regarding a theory to explain their unique features. We have synthesized single crystals of blue bronzes $A_0.3MoO_3$ ($A=K, Rb$) and purple bronzes $A_0.9Mo_6O_{17}$ ($A=Li, Na, K$) using a gradient flux technique and have investigated the optical properties of these materials along different crystallographic axes using optical reflectance spectroscopy. We have taken advantage of annealing the single crystals in various gas flows to analyze changes in their properties after annealing in hopes of contributing to the understanding of the mechanisms at play in these low-dimensional materials. Changes in their structural and magnetic properties upon annealing were investigated via X-ray diffraction and magnetization measurements and will also be reported.

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