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Transport properties of novel molybdenum bronze oxide materials JOSEPH HAGMANN, SON LE, National Institute of Standards and Technology, LYNN SCHNEEMEYER, PATTI OLSEN, Montclair State University, THEO SIEGRIST, Florida State University, CURT RICHTER, DAVID SEILER, National Institute of Standards and Technology — Reduced ternary molybdenum oxides, or bronzes, offer an attractive materials platform to study a wide variety of remarkable physical phenomena, including charge density waves [1] and superconductivity [2], in a system with highly varied structural chemistry. Interesting electronic behaviors in these materials arise from the strong hybridization of the 4d states of high-valent Mo with O p orbitals (conditions amenable to itinerancy) and reduced dimensionality arising from ordered O vacancies. This study aims to demonstrate the transport phenomena in a series of novel molybdenum bronze materials, including the new electrochemically-grown molybdenum bronzes, K3Li3Mo15O47, and the rare earth molybdenum bronze, HoMo16O44, and relate these behaviors to their experimentally-characterized structures. Dependence of the transport behavior on numerous experimental parameters, including temperature, magnetic field, drive voltage and drive current, and gate voltage, is presented to fully reveal charge carrier transport in these materials.

[1] Raub, C. J.; Broadsto.S; Matthias, B. T.; Jensen, M. A.; Sweedler, A. R. Physical Review Letters 1964, 13, 746.
[2] Canadell, E.; Whangbo, M. H. In Physics and Chemistry of Low-Dimensional Inorganic Conductors; Schlenker, C., Dumas, J., Greenblatt, M., van Smaalen, S., Eds.; Plenum Press: New York, 1996, p 271.

Joseph Hagmann
National Institute of Standards and Technology

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