Abstract Submitted
for the MAR08 Meeting of
The American Physical Society

Finite size effects in micro- and nanocrystals of $(TMTSF)_2ClO_4$

P. DHAKAL, J.I. OH, M.J. NAUGHTON[1], Boston College — We report transport measurements in micro- and nanosized crystals of the molecular organic (super)conductor $(TMTSF)_2ClO_4$. Synthesized using the standard electrocrystallization process, various techniques such as focus ion beam-induced metallization, photo lithography, and atomic layer deposition were then employed to successfully make micro- and nano-electrodes contacting these samples. In addition, FIB sculpting was used to reshape crystals to reduce their sizes. We have successfully measured crystals with dimensions as small as 300 nm. We have observed that electrical transport behaviors of these finite sized crystals are very different from those of their parent bulk crystals. We will discuss our observations in terms of various origins such as finite size effects, fabrication-induced defects, and combinations thereof.

[1]This work was supported by NSF Grant No. DMR 0605339.

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Date submitted: 20 Nov 2007 Electronic form version 1.4