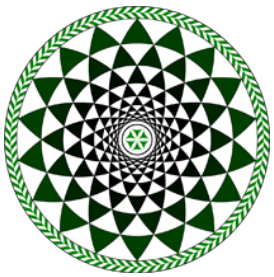

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Manipulating magnetic domains at interfaces of coordination-polymer, nanosized heterostructures

Tuesday, 4 July 2017 10:10 (30 minutes)

In collaboration with Dan Talham and his group in UF Chemistry, the photocontrolled magnetic response of coordination polymer heterostructures has been extended up to 125 K [1], see Figures. Extensions to 200 K and higher are achievable if the photoinduced lattice distortions of the photo-active constituent of the heterostructure can be shifted to this temperature range. After reviewing the present understanding of the basic phenomenon, the presentation will focus on recent [2] and future investigations designed to probe the microscopic/mesoscopic thermal/photo induced changes at the interface. Specifically, the potential use of SANS (small angle neutron scattering) will be discussed.

With the need to identify photo-active candidates whose lattice distortions persist to high temperatures (> 200 K), our recent research has focused on studies of spin crossover complexes on substrates. This direction was motivated by a report of the coexistence of high-spin and low-spin configurations of the second layer of a spin crossover complex on Au [3]. This direction of research employs STM (scanning tunneling microscopy) techniques and is receiving considerable attention [4]. A conjecture, which is now receiving experimental attention, will be described and provides an avenue for computational studies to guide the experimental directions.

Ultimately, independent of scale, most "spintronic"devices are heterostructures, and this work addresses fundamental aspects of the mesoscopic configurations and explores the possible route to photocontrolled applications.

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Acknowledgments This work is part of an ongoing collaboration with Daniel R. Talham in UF Chemistry and involves an extended network of coworkers who are coauthors on our published work. Unpublished results involving SANS and STM investigations involve J. M. Cain and C. Averback (UF Chemistry: sample preparation and characterization), J. J. Hrudka and M. Shatruk (Florida State University Chemistry: sample preparation and characterization), M. R. Fitzsimmons, L. Debeer-Schmitt, T. O. Farmer, D. M. Pajerowski, S. E. Nagler (Neutron Sciences Directorate, Oak Ridge National Lab: SANS), P. Maksymovich and J. Wang (Center for Nanophase Materials Science, Oak Ridge National Lab: STM), A. Feher, M. Orendáč, V. Komanický, T. Samuely, E. Čižmár (P. J. Šafárik University, Košice, Slovakia: STM and EPR). Aspects of this work were

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Summary

[1] O. N. Risset, T. V. Brinzari, M. W. Meisel, D. R. Talham, "Light switchable magnetism in a coordination polymer heterostructure combining the magnetic potassium chromiumhexacyanochromate with the light-responsive rubidium cobalthexacyanoferrate", Chem. Mater. 27 (2015) 6185-6188, doi:10.1021/acs.chemmater.5b02785

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