Abstract Submitted
for the TSF07 Meeting of
The American Physical Society

Surface and optical analyses of a dye-mineral composite – an XPS, FTIR and Raman study WILLIAM DURRER, FELICIA MANCIU, Physics Department, ALEJANDRA RAMIREZ, Materials Research and Technology Institute, RUSSELL CHIANELLI, Materials Research and Technology Institute, University of Texas at El Paso — Maya Purple is a pigment produced by mixing the dye thioindigo with the clay mineral palygorskite. In this investigation, we address the questions of how the dye binds to the clay and how such binding might be affected by the organic-inorganic material ratio and of the heating time used in the preparation of the pigment. Synthetically prepared Maya Purple samples were examined using XPS, FTIR, and Raman spectroscopy. XPS measurements show that pigment preparation results in interactions between the dye and the mineral that give rise to several different binding states of the key elemental components oxygen, sulfur, and aluminum. These results are in good agreement with the Raman analysis, where the appearance and disappearance of bands in the 600 cm^{-1}, 1100 cm^{-1}, and 1600 cm^{-1} regions demonstrate interaction affecting oxygen and sulfur. The data are further corroborated by vibrational line shifting in the FTIR data.

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Date submitted: 28 Sep 2007 Electronic form version 1.4