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From Maya Blue to 21st century materials – a spectroscopic study
FELICIA MANCIU, LAYRA REZA, Physics Department, University of Texas at El Paso, BRENDA TORRES, LORI POLETTE, RUSSELL CHIANELLI, Materials Research and Technology Institute, University of Texas at El Paso, UNIVERSITY OF TEXAS AT EL PASO TEAM — Maya Blue is a famous indigo-based pigment produced by the ancient Mayas. Samples for the present work are made by a synthetic route, and demonstrate similar chemical stability as the ancient Maya Blue samples. Since no direct proof exists that the indigo chemically binds to the inorganic palygorskite lattice, there is still controversy on the resting place of the indigo molecules; *i.e.* are they in the channels of palygorskite, on the surface, or both. Our analysis by FT-Raman and FT-IR spectroscopy proves the partial elimination of the selection rules for the centrosymmetric indigo, and shows the disappearance of the indigo N-H bonding, as the organic molecules incorporate into palygorskite material. Infrared data confirm the loss of zeolitic water and a partial removal of structural water after the heating process. Evidence of bonding between cationic aluminum and indigo through nitrogen is revealed by FT-Raman measurements. X-Ray photoemission spectroscopy and near-edge X-ray absorption fine structure studies performed at Stanford Synchrotron Radiation Laboratory support the aluminium bonding to the organic molecules. The oxygen carbonyl is also believed to interact with the metal.

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