Relating crystal structure to vapochromic responses in polymorphic compounds

Nathaniel Barker\textsuperscript{a}, Stephen Taylor\textsuperscript{b}, Ethan Ferguson\textsuperscript{c}, Jeanette Krause\textsuperscript{d}, William Connick\textsuperscript{e}, and Peng Zhang\textsuperscript{f}

\textsuperscript{a}University of Cincinnati Department of Chemistry, Cincinnati, Ohio 45221, USA, barkernl@mail.uc.edu
\textsuperscript{b}University of Cincinnati Department of Chemistry, Cincinnati, Ohio 45221, USA, taylo264@gmail.com
\textsuperscript{c}University of Cincinnati Department of Chemistry, Cincinnati, Ohio 45221, USA, ethanf109@gmail.com
\textsuperscript{d}University of Cincinnati Department of Chemistry, Cincinnati, Ohio 45221, USA, krauseje@ucmail.uc.edu
\textsuperscript{e}Recently Deceased.
\textsuperscript{f}University of Cincinnati Department of Chemistry, Cincinnati, Ohio 45221, USA, zhangph@ucmail.uc.edu

Vapochromic compounds have been well-known for many years. However, not until the work of Mann and co-workers, studying a mixed Pt\textsuperscript{2+}-Pd salt, that their sensing ability was recognized.\textsuperscript{1} Since then, vapochromic materials, specifically Pt-centered vapochromic complexes, have been widely studied.\textsuperscript{2-4}

We have been working with a vapochromic Pt salt that forms different polymorphs dependent on the recrystallization technique. Upon isolation, these types of materials can be used to detect different volatile organic compounds (VOC’s) or environmentally-troublesome anions with high selectivity and sensitivity by undergoing a noticeable color change. In addition, the emission and response properties undergo a shift that can be directly related to the intra- and inter-dimer Pt-Pt distances of the respective polymorph. X-ray crystallography has been vital in determining the overall structures of these polymorphic complexes and the details of the Pt-Pt interactions that give rise to the color, luminescence, and response properties of these materials.

References