Control of Molecular Arrangement and Polarity in Vapochromic Crystals

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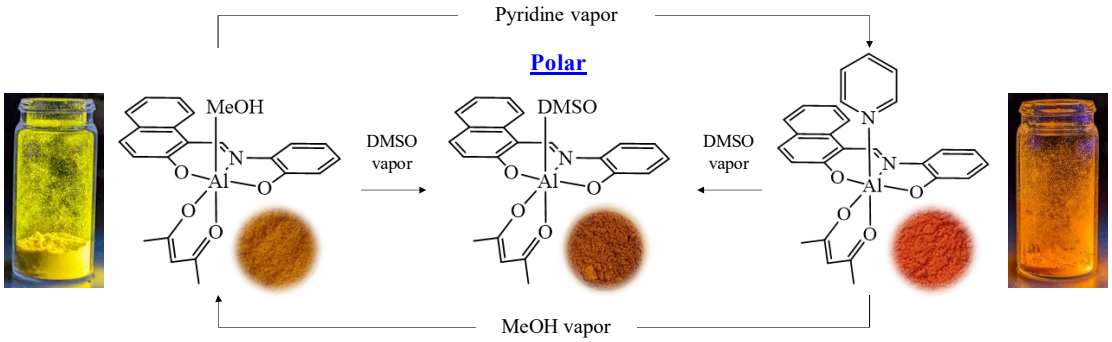
Keywords: *Vapochromic*; *Polarity*; *Dielectric Property*; *Second Harmonic Generation (SHG)*

The development of molecule-based multifunctional materials that are responsive to external stimuli is gaining significant attention recently owing to their advantages for application in novel functional devices, such as memory devices and sensors. In particular, vapor-induced functional switching systems, which exhibit facile structural transformations in response to specific vapor stimuli, have been reported; such transformations include changes in magnetic properties and luminescence properties. However, reports on materials that experience switching of dielectric properties and polarity, such as ferroelectric properties and nonlinear optical effects, are extremely limited.

In our previous study, we demonstrated that mononuclear complexes of type [M(sap)(acac)(solvent)] (M = Fe^{III}, Al^{III}; H_2sap = 2-salicylideneaminophenol; acac = acetylacetonate), incorporating a substitution-prone coordination site, could switch dielectric behavior and polarity, which was attributed to the structural transformations triggered by exposure to solvent vapor.[1,2] The study provided a novel example of vapor-induced polarity switching systems, wherein coordinated solvent substitution was the 'trigger' for the corresponding structural rearrangements. Thus, expanding the scope of application of the above system to other type compounds is highly desirable for the development of multifunctional molecular materials. Herein, we report the first achievement of solvent vapor-induced polarity switching in vapochromic crystals of the type [Al(nap)(acac)(sol)] (H_2nap = *N*-(2-hydroxyphenyl)-2-hydroxy-1-naphthylaldimine; sol = MeOH (**1**), DMSO (**2**), pyridine (**3**)).



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