

# How Solid is the Organic Solid State?

## A New Strategy of Transforming Pharmaceutical Crystal Forms

Jerry L. Atwood  
Department of Chemistry  
University of Missouri  
Columbia, MO 65203 USA  
atwoodj@missouri.edu

The robust nature of network materials allows them to (for example) respond to the external stimuli such as pressure, temperature, light, or gas/solvent adsorption and desorption. There is difficulty in retaining long-range order in purely molecular organic solids, due to weak intermolecular interactions such as van der Waals forces. Here, we show gas-induced transformations of the well-known pharmaceuticals clarithromycin and lansoprazole. For clarithromycin, the stimulus is capable of converting the kinetic solvate and guest-free crystal forms to the commercial thermodynamically stable polymorph with a huge saving in energy cost relative to industrially employed methods. The synthesis of the marketing form of lansoprazole involves a solvate that readily decomposes and that is stirred in water, filtered, and dried intensively. Our method readily circumvents such synthetic problems and transforms the sensitive solvate to the marketed drug substance with ease. Such expedient transformations hold great implications for the pharmaceutical industry in general when considering the ease of transformation and mild conditions employed.