**Poster Presentation**

**MS115.P21**

*Iso-structurality induced solid phase transformations: A case study with lenalidomide*

Ramanaiah Chennuru[^1], Prakash Muthudoss[^2], Raja sekhar voguri[^2], Srividya Ramakrishnan[^2], Vishweshwar peddy[^2], Ravichandra babu[^3], Sudarshan mahapatra[^2]

[^1]: Centre For Excellence In Polymorphism, R&D, CIPLA, Bangalore, Karnataka, India-5, Bangalore, India,
[^2]: centre for excellence in polymorphism, IPDO, Dr. Reddys's, hyderabad, India,
[^3]: Chemistry department, Gitam institute of science(GIS), GITAM university, Vizag, Vishakapatnam, India

E-mail: ramana1985@gmail.com

**Abstract:** Lenalidomide is a thalidomide analogue known for its immunomodulation, antiangiogenic, and antineo plastic properties. However, to date, only two forms of lenalidomide [Form-1 (anhydrous) and Form-2 (hemi-hydrate)] are reported in the literature. Through a comprehensive polymorph screening herein, we report five forms of Lenalidomide [Form-3 (DMF-solvate), Form-4 (anhydrous), Form-5 (DMSO solvate), Form-6 (acetone solvate), and Form-7 (di-hydrate)]. Single crystal structures (for all forms) are established to provide potential knowledge about the intermolecular interactions, three-dimensional structures, and the nature of solvent/water within the lattice. Thermodynamic stability investigations revealed unusual solid state phase transformations which are relatively unexplored to date. It is noteworthy that all solvates upon de-solvation convert to Form-1 (thermo-dynamically stable anhydrous form), whereas all hydrates upon de-hydration convert to a meta stable Form-4 (novel anhydrous form) which, upon further heating, converts to thermodynamically stable form, Form-1. Solid form conversion in different forms of Lenalidomide is pictorially shown in Figure 1. Correlation of results from modeling, single crystal analysis, and non-ambient studies established “iso-structurality” as one of the major factors leading to such bifurcated phase transformations. Mechanisms of de-solvation and de-hydration in different forms of LDM are examined by utilizing various analytical techniques such as variable temperature fourier transform infrared spectroscopy, variable temperature powder X-ray diffraction, differential scanning calorimetry, and hot stage microscopy.


**Keywords:** Iso-structurality, Polymorphism, Solid Form

---

*Figure 1: Solid phase transformations in Lenalidomide.*

---

**Acta Cryst. (2017), A70, C767**