

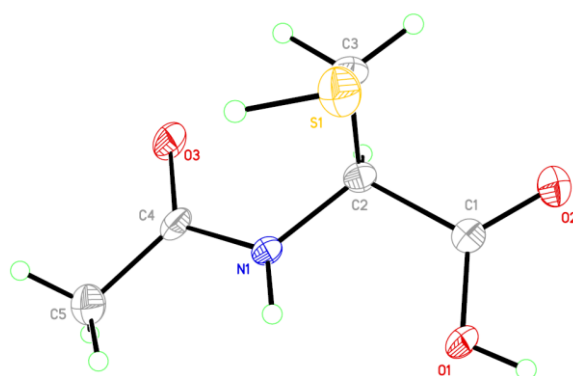
## A new conformational polymorph of N-acetyl-L-cysteine. The role of S–H···O and C–H···O interactions†

S. Sudalai Kumar, and Ashwini Nangia\*

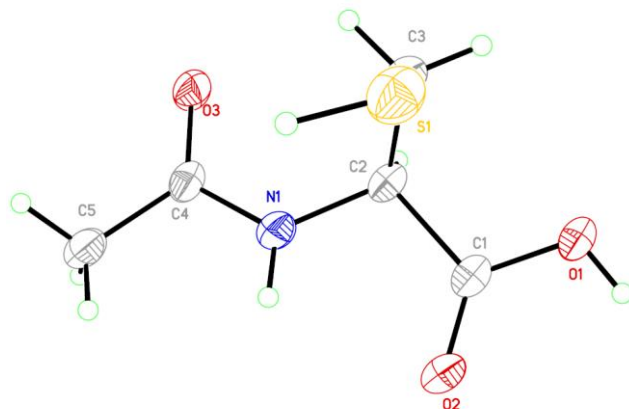
School of Chemistry, University of Hyderabad, Central University PO, Prof. C. R. Rao Road,  
Gachibowli, Hyderabad 500 046, India

E-mail [ashwini.nangia@gmail.com](mailto:ashwini.nangia@gmail.com)

### Electronic Supplementary Information†



**Fig. S1** ORTEP of form I NAC.



**Fig. S2** ORTEP of form II NAC.

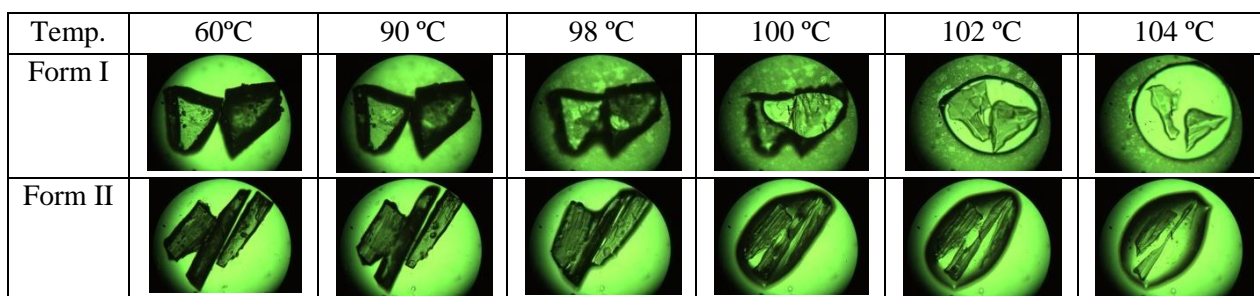


Fig. S3 HSM images of polymorphs I and II of NAC upon heating.

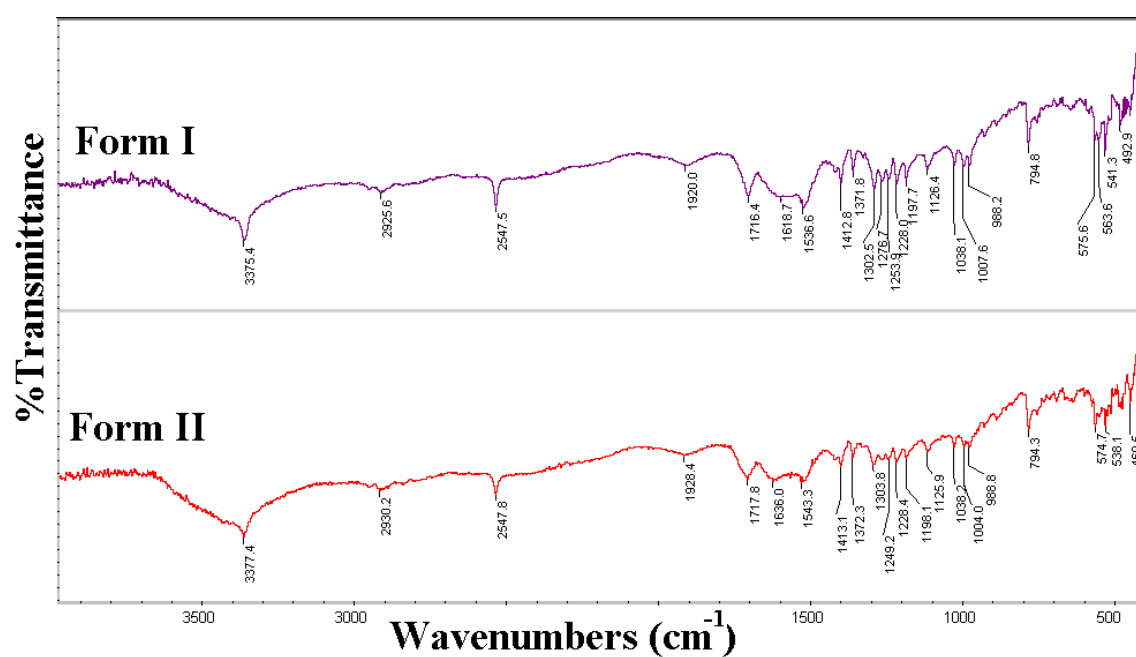
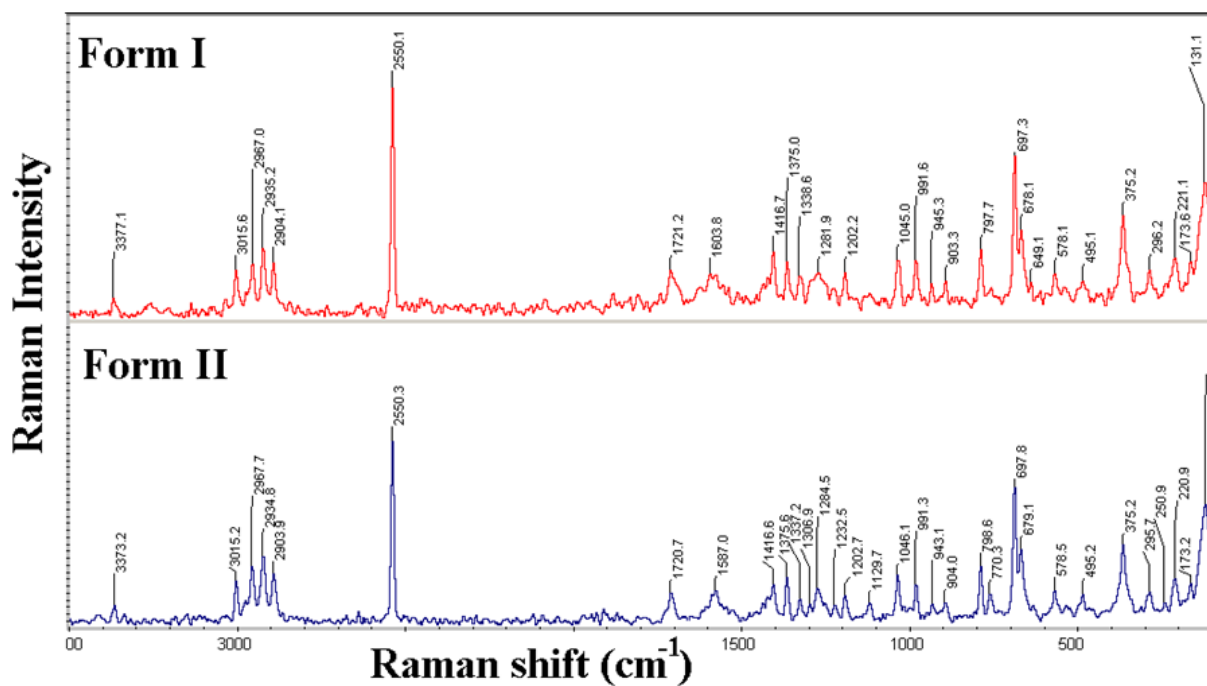


Fig. S4 FT-IR of form I and form II of NAC.

Table S1 Vibrational stretching frequency of NAC polymorphs.

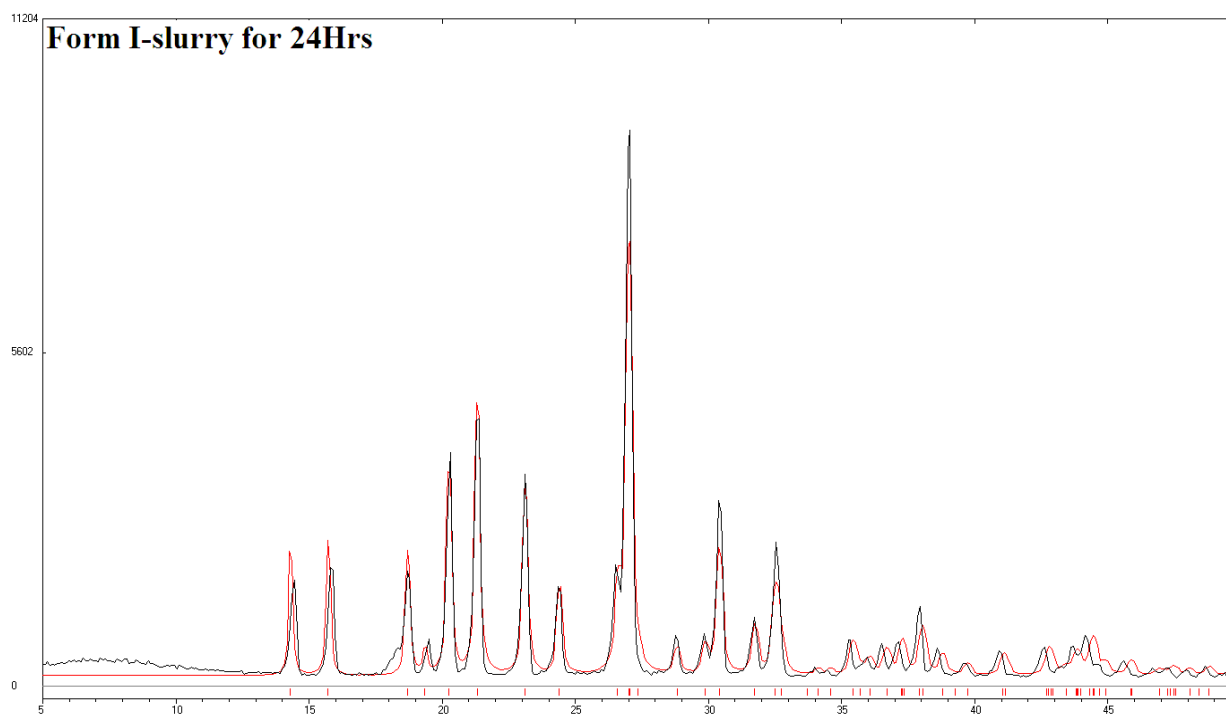
FT-IR (cm <sup>-1</sup> )	N-H stretch	C-H stretch	Carboxylic C=O stretch	Carboxamide C=O stretch	S-H stretch	N-H bend
Form I	3375.4	2925.6	1716.4	1618.7	2547.5	1371.8
Form II	3377.4	2930.2	1717.8	1636.0	2547.8	1372.3



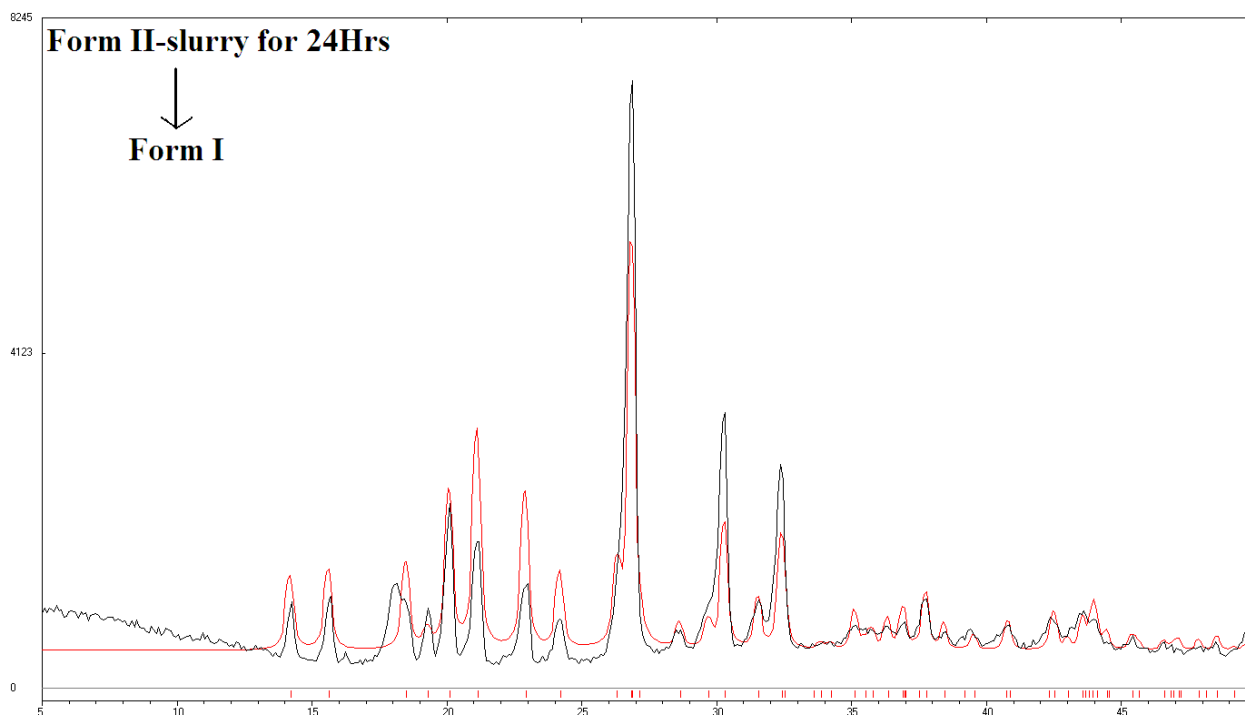
**Fig. S5** FT-Raman spectra NAC polymorphs.

**Table S2** Raman stretching frequency of NAC polymorphs.

FT-Raman (cm <sup>-1</sup> )	N-H stretch	C-H stretch	Carboxylic C=O stretch	Carboxamide C=O stretch	S-H stretch	N-H bend
Form I	3377.1	2935.2	1721.2	1603.8	2550.1	1375.0
Form II	3373.2	2934.8	1720.7	1587.0	2550.3	1375.6



(a)



(b)

**Fig. S6** Powder X-ray diffraction pattern after slurry grinding for 24 h. (a) Form I is stable, and (b) form II transforms to stable modification I. The calculated XRD lines of polymorph I (red) are overlay for reference.

**Table S3** Details of CSD searches on SH interactions and Refcodes.

1. Polymorphism in Sulfur compounds having SH group.

BOQCUF02	GLUTAS05	LCYSTN25	5 compounds are polymorphic with 13 hits in CSD
BOQCUF04	LCYSTN04	TSCARB01	
BOQCUF05	LCYSTN21	WOGRIT01	
GLUTAS03	LCYSTN22		
GLUTAS04	LCYSTN23		

2. Sulfur compounds containing neutral S-H...O interaction.

FATQIC	LAPVUU	TAPZIU*	NALCYS02 <sup>#</sup>	There are 17 and 22 hits in the CSD (no polymorphs)
EMANOW	LAWKIE*	TASPUY*	NALCYS11	
ESABAB	QECSAU	TAXMUA	NALCYS12	
HUDFIW	OFASOD	XEHDOF	NALCYS13	
HUKJUT	RONVAR01		NALCYS14	
HUSNEP	RONVEV		NALCYS15	

\*Multi-component systems, <sup>#</sup> Multiple structures of NAC in VT study.

3. S-H...O<sup>-</sup>, S-H...N and N-H...S in polymorphs.

LCYSTN03	LCYSTN23 <sup>b,c</sup>	GLUTAS03 <sup>a,b,c</sup>	S-H...O <sup>-</sup> (5 hits) S-H...N (7 hits) N-H...S (7 hits) Two polymorphic compounds L-cysteine and Glutathione
LCYSTN04 <sup>a,b,c</sup>	LCYSTN25 <sup>a,b,c</sup>	GLUTAS04 <sup>a,b,c</sup>	
LCYSTN05		GLUTAS05 <sup>a,b,c</sup>	
LCYSTN21		(Glutathione)	
LCYSTN22 <sup>b,c</sup>			
(L-Cysteine)			

<sup>a</sup> S-H...O<sup>-</sup>, <sup>b</sup> S-H...N and <sup>c</sup> N-H...S interactions.

4. Acid-amide O-H...O H-bond.

APENTN02	GLUTAS05	VAMBOA01	MUROXA	26 hits were found with five polymorphs
BUVKEJ	GLUTAS06	VAMBOA02	MUROXA01	
DETBIO01*	INODUK*	WEFVIN*	ACOMUC	
DETBIO10	INODUK01	WEFVIN01	ACOMUC01	
GIZFIF01	MIMMOL	WEFVIN02		
GLUTAS02*	REKBUE	YIPFUY01		
GLUTAS03	SHIVOU			
GLUTAS04	VAMBOA*			

\*5 polymorphs with catemer synthon

5. Acid-amide N-H...O H-bond.

APENTN02	MIMMOL	Two polymorph pairs out of 16 hits
BUVKEJ	PIMBAP04	
DETBIO01	SIHVOU	
BIHXIA*	TIPVIY	
BIHXIA01	ULAWAF	
GLUTAS03	ULAWAF01	
GLUTAS04	VAMBOA01*	
GLUTAS05	VAMBOA02	

\* Polymorphs