mean plane. It makes dihedral angles of 17.4° (2), 85.22° (17) and 65.39° (16), respectively, with the phenyl, xanthene and anthracene ring systems. In the crystal structure, there are intramolecular C—H...O and C—H...N contacts and molecules are also linked by C—H...π interactions.

Typical examples include (Ge0.73Sb0.20,57Te5.40,57)Co3+ · 3(NO3,57)2 (x = 0.31, y = 0.0325; R-3m, a = 4.266, c = 75.02 Å, R1 = 0.051) and Ge0.77,3Sb0.23,7Te5.53 (x = 0.43; R-3m, a = 4.258, c = 97.23 Å, R1 = 0.044). This variation can be described as a long-range ordered occupational modulation which blurs the boundaries between “building blocks”. Quenching obviously leads to partial spinodal decomposition involving wavy concentration fluctuations. These “waves” are perfected by short-range diffusion during annealing, whereas decomposition is impossible as it requires long-range diffusion. Incommensurate concentration modulations have also been observed.

If the basic structure is close to cubic, e.g. in (GeTe)3Sb3Te (x ≳ 3), high-temperature phases with disordered rocksalt-type structures are sometimes observed. Superstructure formation (i.e. either concentration waves or block formation) upon cooling consequently involves multiple twinning. Strain can impede this ordering, resulting in pseudocubic crystals with remarkable diffuse scattering; the maxima coincide with the positions of the strongest superstructure reflections of the corresponding long-range ordered (meta-)stable phases.

Concerning metastable crystalline phases of phase-change alloys, disordered cubic rocksalt-type structures are often assumed.[1] Investigations on comparable bulk samples (e.g. with compositions Ge0.75Sb0.25Te or Ge0.72Sb0.28Te) evidence that pronounced short-range ordering matches with small (distorted) cutouts of the corresponding stable phases. This leads to the hypothesis that metastable crystalline samples may contain twinned and strained nanoscale domains of stable compounds and long-range order is impeded by the stress associated with volume change resulting from partial superstructure formation.

Keywords: phase-change technology; modulated structures; tellurium compounds

Fig 1: The molecular structure of title compound