closest Sb–S interchain distance is 7.1 Å, creating a 1-D antimony sulfide polymer. The light yellow color of this material contrasts with the deeper coloration of others in this family produced thus far[2,3] and for Sb_2S_3 itself; its density (Table III) is about 25% lower than for SbStma[3].

SbSpip. The local geometries found in SbSpip and SbStpa are compared in Figure 2. The coordination of antimony to sulfur to SbSpip is reminiscent of the "semicube" arrangement found in the 2-D antimony sulfide $Cs_6Sb_{10}S_{18}$.[2] In the case of the latter compound the "semicubes" are linked via SbS_3 pyramids to form rings. For SbSpip these semicubes are linked by similar pyramids to form chains.

Although the "chains" are emphasized in the drawings of this structure (Figures 1–3) the interchain distances are short enough that they can be considered to form slabs in (010). The distance between chains in the slab, emphasized in Figure 2, is 3.2 Å; this is shown as the Sb(5)–S(2) distance in Figure 3 and in Table VII. The organic molecule does not interleave with every antimony sulfide chain, as is the case for the TPA material. Instead, the piperazinium ion $[N_2C_4H_8]^{2+}$ alternates with the 2-D slabs of antimony sulfide and is hydrogen bonded to sulfurs in them as shown in Figure 3, where the N(1)···S distances are less than 3.2 Å (Table VII).

Conclusion

The family of novel open sulfides based upon Sb_2S_3 has been expanded. The synthetic techniques described here are quite general and, as was first demonstrated by Bedard and co-workers,[1] can be applied to a large variety of sulfide precursors to produce novel structure types.[2,3] The noncentrosymmetric space group symmetry was confirmed by the observation of a second harmonic signal, but their values, approximately 4 times that of quartz, exclude these compounds as viable second harmonic materials. However, new materials based upon the synthetic strategy outlined here may have more useful nonlinear optical properties.

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Supplementary Material Available: Tables of anisotropic thermal parameters for SbStpa and SbSpip (1 page); listing of structure factor amplitudes and anisotropic thermal parameters (14 pages). Ordering information is given on any current masthead page.

Additions and Corrections

1992, Volume 4.

Ren-Chain Wang, Yiping Zhang, Hengliang Hu, Roberto R. Frausto, and Abraham Clearfield*: Preparation of Lanthanide Arylphosphonates and Crystal Structures of Lanthanum Phenyl- and Benzylphosphonates.

Page 864. The following should be included at the end of the paper:

Supplementary Material Available: Listings of positional parameters, bond angles, bond distances and U values for $La(O_3PCH_2C_6H_5)(HO_3PCH_2C_6H_5)\cdot 2H_2O$ (10 pages); listings of structure factor amplitudes for $La(O_3PCH_2C_6H_5)(HO_3PCH_2C_6H_5)\cdot 2H_2O$ and $La(O_3PC_6H_5)(HO_3PC_6H_5)$ (26 pages). Ordering information is given on any current masthead page.