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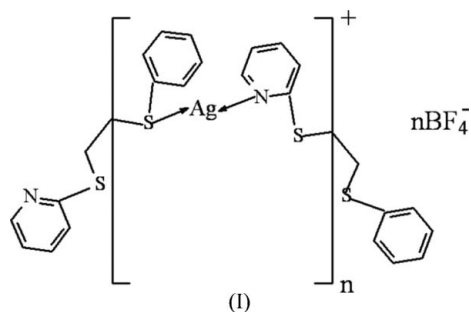
Key indicators

Single-crystal X-ray study
 $T = 293$ K
Mean $\sigma(\text{C}-\text{C}) = 0.007$ Å
Disorder in solvent or counterion
 R factor = 0.036
 wR factor = 0.088
Data-to-parameter ratio = 13.9For details of how these key indicators were automatically derived from the article, see <http://journals.iucr.org/e>.**catena-Poly[[silver(I)- μ -1-phenylsulfanyl-2-(2-pyridylsulfanyl)ethane- κ^2 S¹:N²] tetrafluoroborate]**

In the title complex, $\{[\text{Ag}(\text{C}_{13}\text{H}_{13}\text{NS}_2)]\text{BF}_4\}_n$, the Ag^{I} ions show linear coordination through the N atom from one 1-phenylsulfanyl-2-(2-pyridylsulfanyl)ethane (*L*) molecule and the S atom of another. Each *L* ligand bridges two adjacent Ag atoms through the donor molecules, leading to a linear chain structure.

Comment

There are many silver(I) complexes with substituted bithioether compounds featuring unusual coordination motifs (Hong *et al.*, 2000) in which donor atoms have always been the same. We report here the structure of the silver tetrafluoroborate complex, (I), of AgBF_4 with the *N/S*-donor ligand 1-phenylsulfanyl-2-(2-pyridylsulfanyl)ethane (*L*).



In (I), the Ag^{I} atom exists in a nearly linear geometry (Fig. 1), comprising a pyridyl *N*-atom donor and a phenyl-

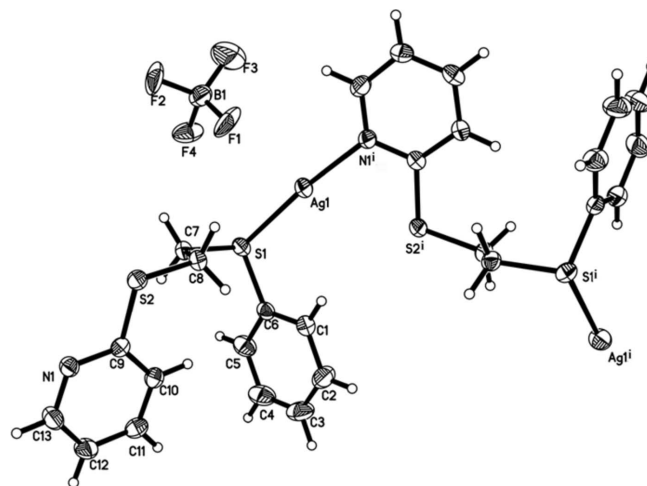


Figure 1
ORTEP (Johnson, 1976) view of the title compound, with 30% probability displacement ellipsoids. The disordered F atoms of the minor component of the BF_4^- groups have been omitted. [Symmetry code: (i) $1 - x, \frac{1}{2} + y, \frac{3}{2} - z$.]

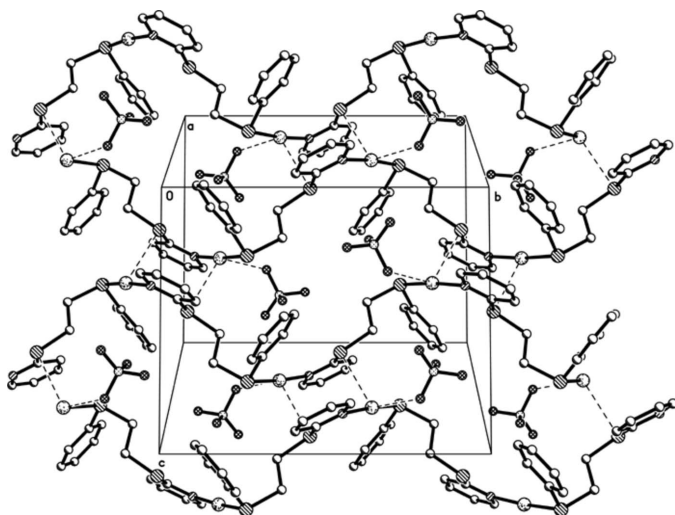


Figure 2
A view of the chains linked through Ag...S weak interactions (dashed lines). H and disordered F atoms have been omitted.

sulfanyl S-atom donor from different *L* molecules. The bond dimensions are within the range reported in similar complexes (Wang *et al.*, 1992; Constable *et al.*, 1998; Hou *et al.*, 2004). The BF₄[−] anion shows a weak interaction with the Ag^I center with an Ag1...F1 distance of 2.630 (9) Å, which is longer than the sum of ionic radii (2.31 Å; Shannon & Prewitt, 1969). This interaction causes a small distortion of the linear coordination of the Ag^I atom [S1—Ag1—N1ⁱ = 174.02 (9)°].

In the ligand, the phenyl and pyridyl rings are inclined with respect to each other at an angle of 73.1 (2)° and the S1...S2 non-bonded distance is 4.417 (2) Å. Each ligand bridges two adjacent Ag atoms through Ag—N and Ag—S coordination to give rise to an infinite chain running along the *b* axis. In the crystal packing of (I), adjacent chains are potentially linked into a two-dimensional network (Fig. 2) through weak Ag...S interactions [Ag1...S2(*x*, $\frac{3}{2} - y$, $-\frac{1}{2} + z$) = S2...Ag1(*x*, $\frac{3}{2} - y$, $\frac{1}{2} + z$) = 3.013 (1) Å; Suenaga *et al.*, 1999]. The anions are found between the layers.

Experimental

1-Phenylsulfanyl-2-(2-pyridylsulfanyl)ethane (*L*) was prepared according to a reported procedure (Chen *et al.*, 2001). A solution containing a 1:1 molar ratio of AgBF₄ (0.2 mmol) and *L* (0.2 mmol) in acetonitrile–chloroform (1:1) was stirred for 30 min at room temperature, and the mixture was filtered. Colorless single crystals suitable for X-ray investigation were obtained from this filtrate by slow evaporation of the solvent.

Crystal data

[Ag(C₁₃H₁₃NS₂)]BF₄
M_r = 442.04
 Monoclinic, *P*2₁/*c*
a = 11.252 (3) Å
b = 13.999 (4) Å
c = 11.315 (3) Å
 β = 116.227 (4)°
V = 1598.8 (8) Å³
Z = 4

D_x = 1.836 Mg m^{−3}
 Mo *K*α radiation
 Cell parameters from 1006 reflections
 θ = 3.6–25.8°
 μ = 1.56 mm^{−1}
T = 293 (2) K
 Block, colorless
 0.16 × 0.12 × 0.08 mm

Data collection

Bruker SMART 1000 CCD diffractometer
 φ and ω scans
 Absorption correction: multi-scan (SADABS; Sheldrick, 1996)
T_{min} = 0.643, *T_{max}* = 0.883
 9039 measured reflections

3260 independent reflections
 2324 reflections with *I* > 2σ(*I*)
R_{int} = 0.036
 θ_{\max} = 26.4°
h = −10 → 14
k = −13 → 17
l = −14 → 9

Refinement

Refinement on *F*²
R[*F*² > 2σ(*F*²)] = 0.036
wR(*F*²) = 0.088
S = 0.99
 3260 reflections
 235 parameters
 H-atom parameters constrained

$w = 1/[\sigma^2(F_o^2) + (0.0437P)^2 + 0.3971P]$
 where $P = (F_o^2 + 2F_c^2)/3$
 $(\Delta/\sigma)_{\max} = 0.004$
 $\Delta\rho_{\max} = 0.52 \text{ e } \text{Å}^{-3}$
 $\Delta\rho_{\min} = -0.39 \text{ e } \text{Å}^{-3}$

Table 1

Selected geometric parameters (Å, °).

Ag1—N1 ⁱ	2.181 (3)	Ag1—S1	2.4127 (11)
N1 ⁱ —Ag1—S1	174.02 (9)		
Symmetry code: (i) $-x + 1, y + \frac{1}{2}, -z + \frac{3}{2}$			

All H atoms were positioned geometrically with *Csp*²—H = 0.93 Å and *Csp*³—H = 0.97 Å; they were constrained to ride on their parent atoms, with *U*_{iso}(H) = 1.2*U*_{eq}(C). The BF₄[−] anion was observed to be disordered and was eventually modeled as eight 0.5-occupied F atoms surrounding the central B atom.

Data collection: *SMART* (Bruker, 1998); cell refinement: *SMART*; data reduction: *SAINT* (Bruker, 1998); program(s) used to solve structure: *SHELXS97* (Sheldrick, 1997); program(s) used to refine structure: *SHELXL97* (Sheldrick, 1997); molecular graphics: *SHELXTL* (Bruker, 1998); software used to prepare material for publication: *SHELXTL*.

We gratefully acknowledge financial support from the National Natural Science Foundation of China (No. 20206022) and Tianjin Natural Science Foundation (05YFJZJC02000).

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