Effect of butterfly-shaped sulfur-bridged ligand and counter anions on the catalytic activity and diastereoselectivity of organobismuth complexes

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Experimental Section

There exist O-H···O or O-H···F hydrogen bonds between the anions and cations in compounds **2-5**, as shown in Table S1 and Figures S1-S4.

Table S1 Hydrogen-bonding geometry (Å) of compounds **2-5**.

	D-H···A	D-H	H···A	D···A	D-H···A
2	O1-H1B···O5	0.83(2)	1.89(4)	2.712(17)	169(16)
	O1-H1A···O4A[a]	0.83(2)	1.97(3)	2.801(17)	176(14)
	O1-H1B···O5A[a]	0.83(2)	2.62(10)	3.182(17)	126(10)
3	O1-H1B···F1	0.85(2)	1.90(4)	2.725(8)	166(12)
	O1-H1A···F3A[b]	0.85(2)	1.90(4)	2.733(10)	166(12)
4	O1-H1A···O4A[c]	0.91(2)	1.82(5)	2.676(5)	157(12)
	O1-H1···O3A[d]	0.888(19)	1.82(2)	2.706(6)	173(5)
5	O1-H1A···O4A[e]	0.852(11)	2.52(12)	2.755(14)	97(9)
	O1-H1B···O3A[f]	0.851(11)	1.80(3)	2.64(2)	171(13)

Symmetry codes: [a] x, -0.5-y, 0.5+z; [b] x, -y-1.5, 0.5+z; [c] x,-y+0.5,z+0.5; [d] x, y-1, z+1; [e] x, 1.5-y, 0.5+z; [f] x, y+1, z

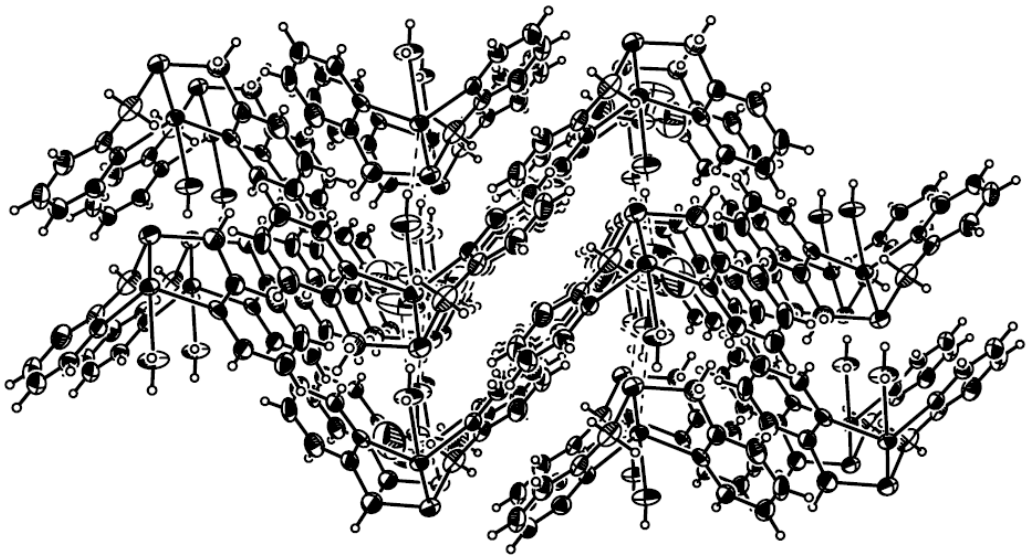

Figure S1. Packing drawing of the complex **2** along *b* axis with 30% thermal ellipsoid probability.

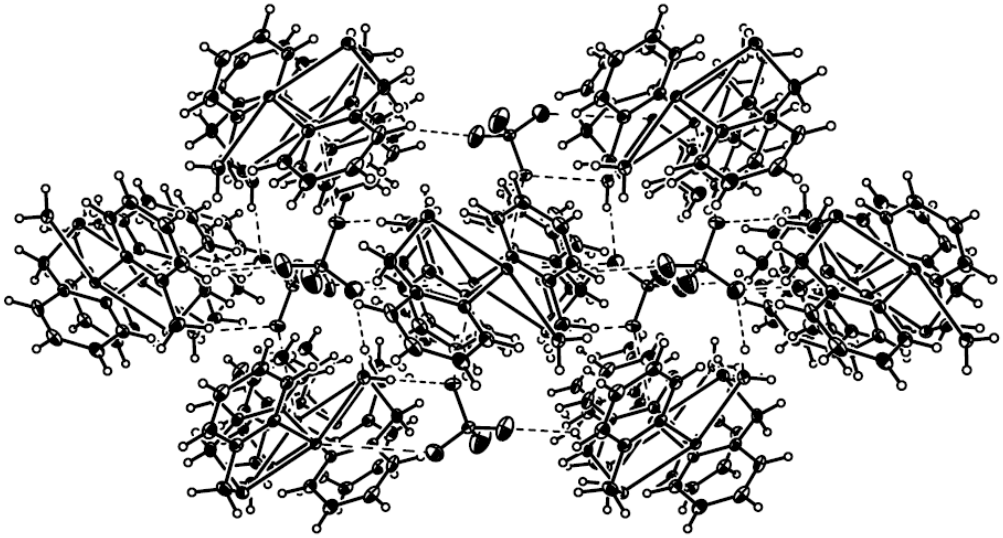

Figure S2. Packing drawing of the complex **3** along *a* axis with 30% thermal ellipsoid probability.

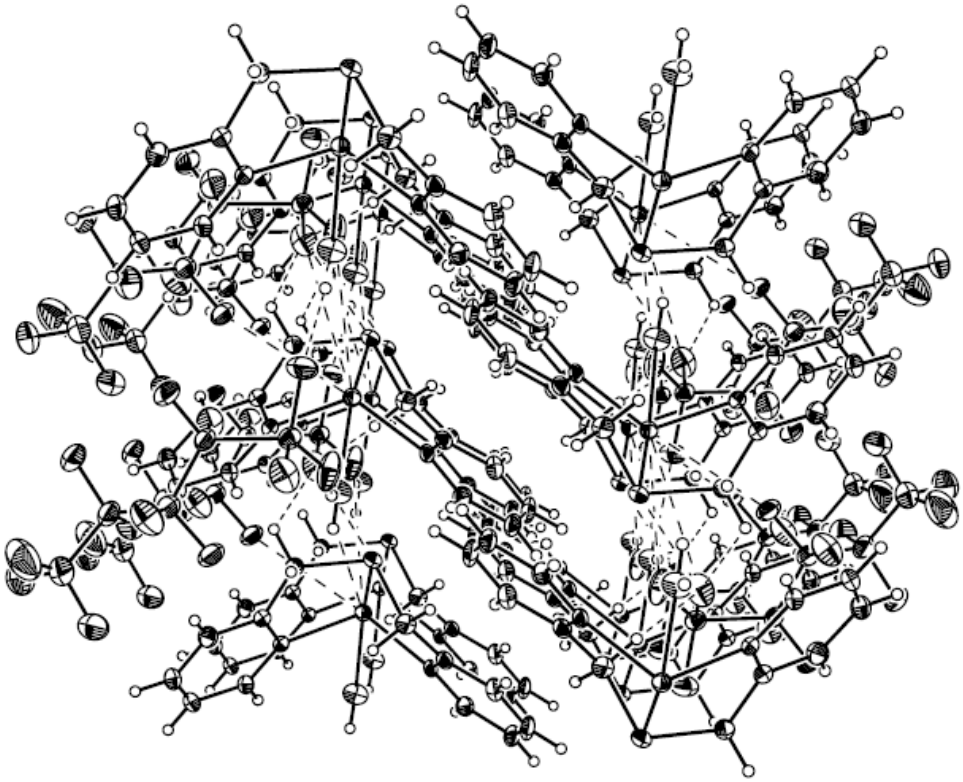

Figure S3. Packing drawing of the complex **4** along *b* axis with 30% thermal ellipsoid probability.

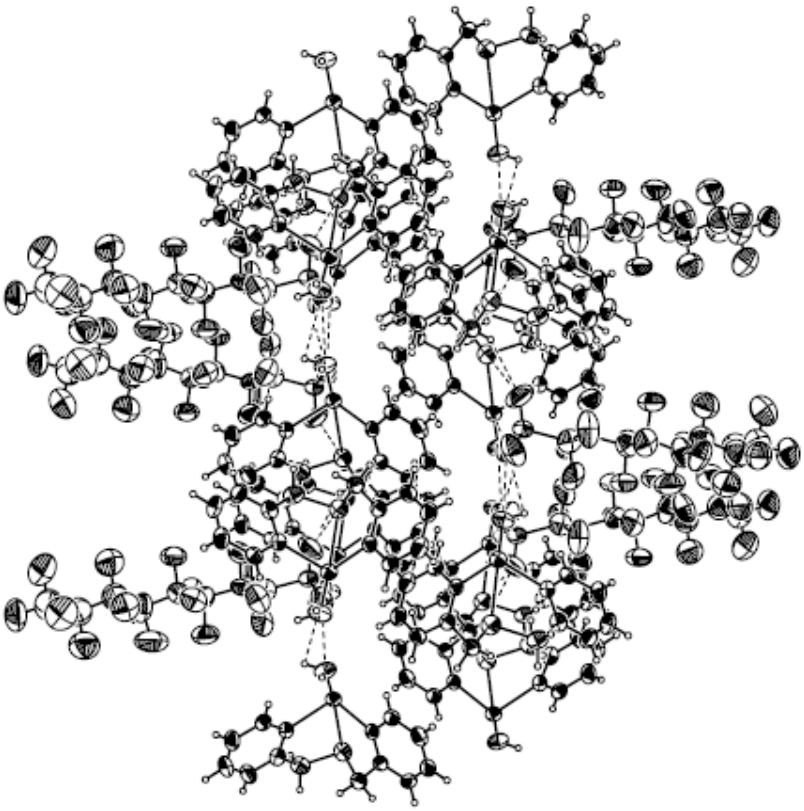

Figure S4. Packing drawing of the complex **5** along *c* axis with 30% thermal ellipsoid probability.

Table S2 Hydrogen-bonding geometry (Å) of complex **1**.

D-H···A	D-H	H···A	D···A	D-H···A
C8-H8B···Cl1[a]	0.97	2.64	3.606(17)	171.7
C13-H13A···Cl1	0.93	2.65	3.37(2)	134.6
C16-H16A···Cl2	0.93	2.71	3.401(19)	131.6
C21-H21B···Cl2A[b]	0.97	2.70	3.666(17)	174.0
C36-H365A···Cl3A[c]	0.97	2.70	3.666(17)	172.2
C41-H41A···Cl3	0.93	2.71	3.409(19)	132.2
C50-H50A···Cl4[d]	0.97	2.72	3.674(17)	169.2
C55-H55A···Cl4	0.93	2.72	3.401(16)	130.7

Symmetry codes: [a] x-1, y, z; [b] x, 1+y, z; [c] x, y-1, z; [d] x+1, y, z.

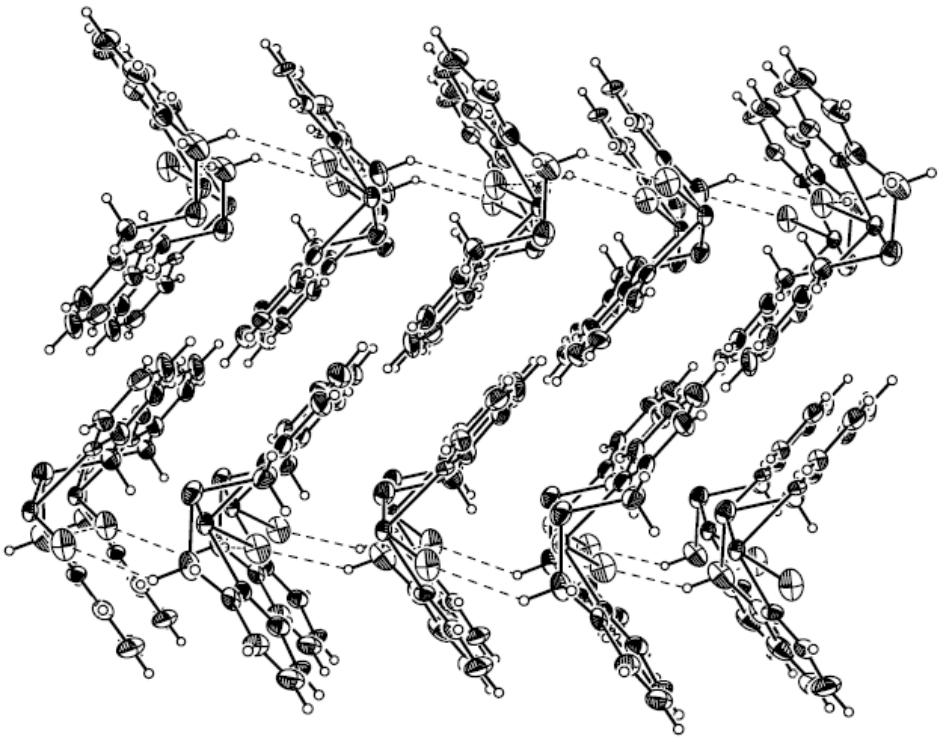

Fig. S5 Packing drawing of the complex **1** along *a* axis with 30% thermal ellipsoid probability.