

**Qian-Yong Cao,<sup>a\*</sup> Bei Yin<sup>a</sup> and  
 Jing-Hua Liu<sup>b</sup>**

<sup>a</sup>Department of Chemistry, Nanchang University, Nanchang, 330047, People's Republic of China, and <sup>b</sup>School of Science, Nanchang University, Nanchang, 330047, People's Republic of China

Correspondence e-mail: cqyong@ncu.edu.cn

**Key indicators**

Single-crystal X-ray study  
 T = 293 K  
 Mean  $\sigma(\text{C}-\text{C}) = 0.011 \text{ \AA}$   
 R factor = 0.038  
 wR factor = 0.079  
 Data-to-parameter ratio = 17.0

For details of how these key indicators were automatically derived from the article, see <http://journals.iucr.org/e>.

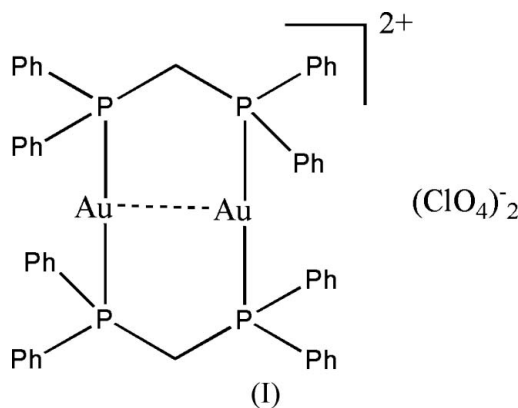
**Bis[ $\mu$ -bis(diphenylphosphino)methane- $\kappa^2 P:P'$ ]-digold(I) bis(perchlorate)**

In the centrosymmetric title compound,  $[\text{Au}_2(\text{C}_{25}\text{H}_{22}\text{P}_2)_2](\text{ClO}_4)_2$ , the  $\text{Au}^{\text{I}}$  ion adopts a linear geometry with a weak intra-cation  $\text{Au} \cdots \text{Au}$  interaction, characterized by a metal-metal separation of 2.9258 (9)  $\text{Å}$ .

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**Comment**

Binuclear gold complexes including the  $[\text{Au}_2(\text{dppm})_2]^{2+}$  cation [dppm is bis(diphenylphosphino)methane] and different counter-ions are of interest owing to their rich luminescence and bonding properties (Khan *et al.*, 1988; King *et al.*, 1989; Che *et al.*, 1989; Li *et al.*, 1992). Some of them have been structurally characterized (Jaw *et al.*, 1989; Khan *et al.*, 1989; Wang *et al.*, 1989; Porter *et al.*, 1989; Liou *et al.*, 1994; Wang & Liu, 1994; Bauer & Schmidbaur, 1997; Wu *et al.*, 2003). Here, we report another crystal structure belonging to this family of complexes, namely  $[\text{Au}_2(\text{dppm})_2](\text{ClO}_4)_2$  (I).



The asymmetric unit of (I) consists of one half-cation  $[\text{Au}(\text{dppm})]^+$  and a perchlorate anion; there is a centre of symmetry at the mid-point of the  $\text{Au} \cdots \text{Au}$  vector. The  $\text{Au}^{\text{I}}$  ions in  $[\text{Au}_2(\text{dppm})_2]^{2+}$  are doubly bridged by two dppm ligands (Fig. 1) and adopt a linear coordination (Table 1). The  $\text{Au}1 \cdots \text{Au}1^i$  separation [symmetry code: (i)  $1 - x, 1 - y, 1 - z$ ] of 2.9258 (9)  $\text{Å}$  is within the normal range expected for a weak  $\text{Au} \cdots \text{Au}$  interaction (Schmidbaur, 1995).

**Experimental**

The title compound was prepared by a literature method (Li *et al.*, 1992). Well formed colourless crystals suitable for X-ray diffraction measurements were grown by slow diffusion of diethyl ether into a solution of the salt in acetonitrile at 298 K.

## Crystal data

[Au<sub>2</sub>(C<sub>25</sub>H<sub>22</sub>P<sub>2</sub>)<sub>2</sub>](ClO<sub>4</sub>)<sub>2</sub> $M_r = 1361.56$ Monoclinic,  $P2_1/n$  $a = 10.569$  (4) Å $b = 17.648$  (6) Å $c = 13.797$  (5) Å $\beta = 105.287$  (5)° $V = 2482.3$  (15) Å<sup>3</sup> $Z = 2$  $D_x = 1.822$  Mg m<sup>-3</sup>Mo  $K\alpha$  radiation $\mu = 6.19$  mm<sup>-1</sup> $T = 293$  (2) K

Block, colorless

 $0.28 \times 0.20 \times 0.14$  mm

## Data collection

Bruker SMART APEX-II CCD

area-detector diffractometer

 $\varphi$  and  $\omega$  scans

Absorption correction: multi-scan

(SADABS; Sheldrick, 1996)

 $T_{\min} = 0.225$ ,  $T_{\max} = 0.420$ 

13943 measured reflections

5069 independent reflections

3681 reflections with  $I > 2\sigma(I)$  $R_{\text{int}} = 0.056$  $\theta_{\max} = 26.4^\circ$ 

## Refinement

Refinement on  $F^2$  $R[F^2 > 2\sigma(F^2)] = 0.038$  $wR(F^2) = 0.079$  $S = 0.95$ 

5069 reflections

298 parameters

H-atom parameters constrained

 $w = 1/[\sigma^2(F_o^2) + (0.0322P)^2]$ where  $P = (F_o^2 + 2F_c^2)/3$  $(\Delta/\sigma)_{\max} = 0.001$  $\Delta\rho_{\max} = 1.56$  e Å<sup>-3</sup> $\Delta\rho_{\min} = -1.23$  e Å<sup>-3</sup>

Table 1

Selected geometric parameters (Å, °).

Au1—P2 <sup>i</sup>	2.3118 (15)	Au1—Au1 <sup>i</sup>	2.9258 (9)
Au1—P1	2.3138 (15)		
P2 <sup>i</sup> —Au1—P1	177.14 (5)	P1—Au1—Au1 <sup>i</sup>	91.81 (4)
P2 <sup>i</sup> —Au1—Au1 <sup>i</sup>	91.02 (4)		

Symmetry code: (i)  $-x + 1, -y + 1, -z + 1$ .

All H atoms were positioned geometrically and treated as riding (C—H = 0.97 Å for methylene H atoms and C—H = 0.93 Å otherwise), with  $U_{\text{iso}}(\text{H}) = 1.2U_{\text{eq}}(\text{C})$ . The highest peak and deepest hole in the final difference map are associated with the Au1 site (at distances of 0.91 and 0.86 Å, respectively).

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.

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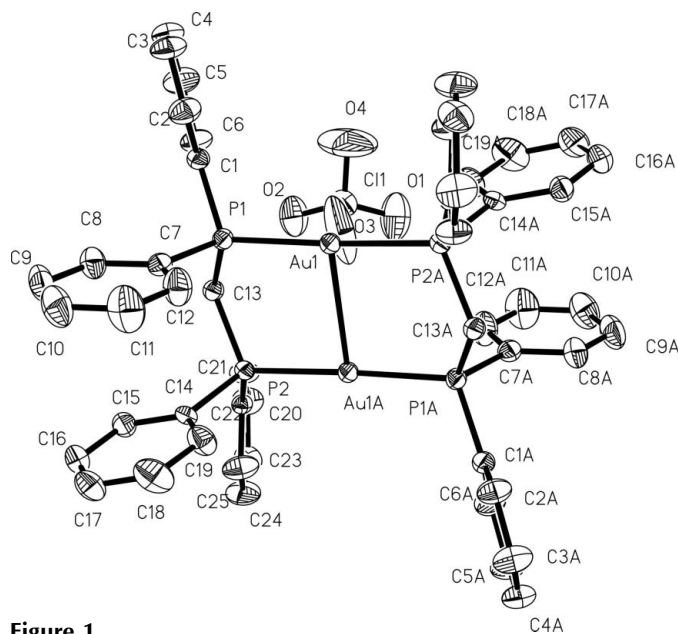


Figure 1

The structure of the cation and anion of (I), showing the atom-numbering scheme. The suffix A corresponds to symmetry code i in Table 1. Displacement ellipsoids are drawn at the 30% probability level and H atoms are omitted for clarity.

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