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Crystal structure of poly[(μ_3 -9*H*-carbazole-3,6-dicarboxylato- $\kappa^3 O^1: O^2: O^3$)(μ_2 -4-(pyridin-4-yl)pyridine- $\kappa^2 N^1: N^{1'}$)zinc(II)], $C_{19}H_{11}N_2O_4Zn$

$V = 3132.8(8) \text{ \AA}^3$, $R_{\text{gt}}(F) = 0.0436$, $wR_{\text{ref}}(F^2) = 0.1193$,
 $T = 172(2) \text{ K}$.

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A part of the title crystal structure is shown in the figure. Hydrogen atoms are omitted for clarity. Tables 1 and 2 contain details of the measurement method and a list of the atoms including atomic coordinates and displacement parameters.

Table 1: Data collection and handling.

Crystal:	Colorless block
Size:	$0.21 \times 0.20 \times 0.17 \text{ mm}$
Wavelength:	Mo $K\alpha$ radiation ($0.71073 \text{ \AA}$)
μ :	1.60 mm^{-1}
Diffractometer, scan mode:	Bruker SMART, φ and ω -scans
θ_{max} , completeness:	28.4° , $>98\%$
$N(hkl)_{\text{measured}}$, $N(hkl)_{\text{unique}}$, R_{int} :	9782, 3828, 0.040
Criterion for I_{obs} , $N(hkl)_{\text{gt}}$:	$I_{\text{obs}} > 2 \sigma(I_{\text{obs}})$, 2749
$N(\text{param})_{\text{refined}}$:	235
Programs:	Bruker programs [1], SHELX [2, 3]

Source of material

A mixture of 9*H*-carbazole-3,6-dicarboxylic acid (H_2L) (0.2 mmol), 4-(pyridin-4-yl)pyridine (0.2 mmol), $Zn(NO_3)_2 \cdot 6(H_2O)$ (0.2 mol), and H_2O (20 mL) was stirred for ten minutes. The mixture was transferred in a 25 mL stainless steel reactor with a Teflon liner and heated from 298 to 453 K in 5 h and a constant temperature was maintained at 453 K for 72 h. After cooling to room temperature, colourless block crystals were collected in 52.6% yield based on Zn.

Experimental details

The U_{iso} values of the hydrogen atoms of parts of carbon group were set to $1.2U_{\text{eq}}(C)$. Hydrogen atoms of water molecules were located from electron density map. A Flack parameter of 0.012(15) was obtained.

Discussion

Coordination polymers (CPs) are known for their diversified, designable and tailorable structures as well as unique

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Abstract

$C_{19}H_{11}N_2O_4Zn$, monoclinic, $C2/c$ (no. 15), $a = 21.645(3) \text{ \AA}$, $b = 11.4467(18) \text{ \AA}$, $c = 12.985(2) \text{ \AA}$, $\beta = 103.156(3)^\circ$, $Z = 8$,

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Table 2: Fractional atomic coordinates and isotropic or equivalent isotropic displacement parameters (Å²).

Atom	x	y	z	U _{iso} [*] /U _{eq}
Zn1	0.99913(2)	0.19254(3)	0.52237(3)	0.03582(14)
N1	0.79678(11)	0.6325(2)	0.8103(2)	0.0397(6)
H1	0.812883	0.683555	0.859758	0.048*
N2	1.08788(10)	0.2283(2)	0.5068(2)	0.0351(5)
O1	0.50506(9)	0.55051(19)	0.61262(16)	0.0393(5)
O2	0.54306(9)	0.36949(19)	0.61585(16)	0.0405(5)
O3	0.86997(9)	0.26754(18)	0.49549(16)	0.0362(5)
O4	0.96532(10)	0.3259(2)	0.5796(2)	0.0506(6)
C1	0.54997(13)	0.4766(3)	0.6368(2)	0.0327(6)
C2	0.61470(13)	0.5163(2)	0.6911(2)	0.0315(6)
C3	0.62368(13)	0.5976(3)	0.7736(2)	0.0361(7)
H3	0.587862	0.626799	0.796252	0.043*
C4	0.68313(14)	0.6361(3)	0.8225(2)	0.0374(7)
H4	0.689380	0.686205	0.882284	0.045*
C5	0.73398(12)	0.5995(2)	0.7816(2)	0.0313(6)
C6	0.72624(12)	0.5178(2)	0.6984(2)	0.0275(6)
C7	0.66595(12)	0.4735(2)	0.6549(2)	0.0295(6)
H7	0.660049	0.415180	0.601481	0.035*
C8	0.83034(13)	0.5723(2)	0.7487(2)	0.0342(6)
C9	0.78858(12)	0.4995(2)	0.6778(2)	0.0284(6)
C10	0.81262(12)	0.4269(2)	0.6109(2)	0.0289(6)
H10	0.784946	0.378059	0.561890	0.035*
C11	0.87683(12)	0.4259(2)	0.6160(2)	0.0318(6)
C12	0.91695(14)	0.5027(3)	0.6838(3)	0.0445(8)
H12	0.960869	0.503445	0.684024	0.053*
C13	0.89470(14)	0.5774(3)	0.7501(3)	0.0468(8)
H13	0.922200	0.630261	0.795069	0.056*
C14	0.90480(13)	0.3339(2)	0.5573(2)	0.0324(6)
C15	1.11196(14)	0.1688(3)	0.4367(3)	0.0503(9)
H15	1.084476	0.119506	0.387871	0.060*
C16	1.17461(14)	0.1754(3)	0.4318(3)	0.0474(9)
H16	1.189509	0.130647	0.380772	0.057*
C17	1.21593(12)	0.2465(2)	0.5007(2)	0.0296(6)
C18	1.19075(14)	0.3092(3)	0.5716(3)	0.0486(9)
H18	1.217070	0.359951	0.620638	0.058*
C19	1.12712(15)	0.2983(3)	0.5717(3)	0.0484(9)
H19	1.110785	0.343414	0.620931	0.058*

chemical and physical properties. Over the past three decades, CPs have been paid much attention for their great potential applications in many areas [4–7]. Recently, considerable attention has been geared towards two-dimensional coordination polymers or MOFs. Compared with three-dimensional CPs, two-dimensional CPs feature outstanding characters with ultrathin thickness, enormous specific surface areas and more accessible active sites, making them auspicious two-dimensional materials [8, 9].

In the title complex, there is one crystallographically independent zinc(II) ion, one *L* ligand, and one half of 4-(pyridin-4-yl)pyridine. The zinc(II) is four-coordinated by three O atoms from three *L* ligands, and one N atom from

one 4-(pyridin-4-yl)pyridine ligand to form a distorted tetrahedron. The distances at the Zn are: d(Zn1–O1) = 1.991(2) Å, d(Zn1–O2) = 1.953(2) Å, d(Zn1–O4) = 1.915(2) Å, and d(Zn1–N2) = 2.019(2) Å, respectively. The Zn(II) coordination angles are in the normal range from 101.43(9)° to 129.12(18)°. Two Zn(II) ions are linked to form a dinuclear building unit (SBU) bridged by two *L* ligands. These SBUs and ligands are connected to form a (2,6)-connected two-dimensional layer framework with paddle-like topology. These two-dimensional layers are packed together to form three-dimensional framework structures. In addition, similar two-dimensional structures have been reported, for example, [Cu₄(dpk 3CH₃O)₂(N₃)₆]_n and [Co(L)₂(SCN)₂·2(CH₃CN)·2(dmff)]_n [10, 11].

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