Table S1. Resistivity values of representative stratigraphic and lithological samples in research area and stratum thickness.

Stratum	Lithology	Quantity	ρ(Ω.m)	Averange(Ω.m)	Thickness（m）
Q	claystone	33	78.59 ~ 197.27	90.83	0~34
P3l	silty claystone	31	159.4 ~ 575.1	269.5	0~40
P3β	basalt	32	1356.21 ~ 2374.42	1767.44	20~100
P2m+q	limestone	34	2696.79 ~ 6625.37	4625.62	163~440
P2l	silty claystone	33	96.72 ~ 645.72	252.91	17~31
C1b	dolomite	33	1435.23 ~ 2779.4	2146.2	50~80
C1jj	bauxite	36	125.63 ~ 867.03	376.48	0~25
∈2q	dolomite	32	2435.23 ~ 5779.4	3546.2	195~248

Table S2. Major elements (%) of Jiujialu Formation ore-bearing rock series, samples from the Xiaoyuan bauxite deposit. .

Sample	Zk0305-1	Zk0305-2	Zk0305-3	Zk0504-1	Zk0504-2	Zk1708-1	Zk1708-2	Zk1708-3	Zk0506-1	Zk0506-2
Al2O3	65.55	71.62	64.06	58.70	61.60	53.79	63.11	65.35	54.25	40.69
SiO2	15.56	7.65	13.26	7.00	12.60	25.64	18.80	14.79	24.55	12.00
Fe2O3	0.30	0.74	3.56	11.99	5.95	1.73	2.37	0.95	3.11	19.68
TS	0.03	0.18	2.66	8.71	2.72	1.10	1.88	0.52	0.01	0.02
TiO2	2.26	3.23	2.62	3.23	2.93	2.60	3.05	3.38	1.89	1.60
LOI	11.38	13.46	12.38	15.74	12.45	9.55	11.62	11.37	9.40	14.26
Al/Si	4.21	9.36	4.83	8.39	4.89	2.10	3.36	4.42	2.21	3.39
Sample	Zk0608-1	Zk0608-2	Zk0608-3	Zk0719-1	Zk0719-2	Zk0719-3	Zk1508-1	Zk1508-2	Zk1508-3	Zk1519-1
Al2O3	74.02	77.85	77.36	70.85	67.55	55.33	67.50	73.78	67.50	75.10
SiO2	7.04	2.69	3.36	8.75	10.10	25.52	12.18	6.07	12.52	4.62
Fe2O3	0.67	0.47	0.51	1.23	3.32	1.15	0.40	0.73	0.76	0.75
TS	0.26	0.08	0.06	0.27	1.50	0.44	0.07	0.19	0.16	0.03
TiO2	3.50	3.95	3.84	3.99	3.31	2.49	4.18	3.65	3.28	3.80
Al/Si	13.12	13.94	23.02	8.10	6.69	2.17	5.54	12.15	5.39	16.26
LOI	10.51	28.94	13.82	12.75	12.88	12.54	11.70	13.09	11.70	13.76
Sample	Zk1519-2	Zk1519-3	Zk1706-1	Zk1706-2	Zk1706-3	Zk1712-1	Zk1712-2	Zk1712-3	Zk2304-1	Zk2304-2
Al2O3	76.91	72.59	45.28	54.57	59.60	75.15	77.82	77.32	54.96	67.55
SiO2	3.45	7.26	23.82	19.28	19.96	4.46	2.55	2.51	23.90	13.56
Fe2O3	0.88	0.71	9.92	5.95	1.79	0.99	0.78	0.75	2.82	0.94
TS	0.02	0.04	7.75	4.29	0.92	0.30	0.09	0.14	-	-
TiO2	3.66	3.68	2.26	2.72	3.00	3.94	3.80	4.22	2.36	3.25
Al/Si	22.29	10.00	1.90	2.83	2.99	16.85	30.52	30.80	2.30	4.98
LOI	13.86	13.08	12.40	11.64	10.47	13.70	14.03	13.93	9.87	11.60

Sample	Zk2304-3	Zk2708-1	Zk2708-2	Zk2708-3	Zk2712-1	Zk2712-2	Zk2712-3	Zk2919-1	Zk2919-2	Zk2919-3
Al2O3	60.34	64.70	70.31	65.62	73.97	68.72	77.68	73.17	76.36	69.47
SiO2	20.26	15.95	10.64	13.80	4.44	10.46	2.02	6.10	3.35	2.79
Fe2O3	0.86	1.39	0.54	0.72	1.35	0.95	0.59	1.08	0.99	7.41
TS	-	0.70	0.04	0.21	0.58	0.27	0.13	0.53	0.41	5.66
TiO2	3.35	2.68	3.59	4.03	4.47	4.35	4.18	3.35	3.44	3.50
Al/Si	2.98	4.06	6.61	4.76	16.66	6.57	38.46	12.00	22.79	24.90
LOI	10.26	11.53	12.34	11.80	13.61	12.05	14.15	13.26	13.96	15.18

Sample	Zk5115-1	Zk5115-2	Zk5115-3	Zk5123-1	Zk5123-2	Zk5123-3	Zk2412-1	Zk2412-2
Al2O3	48.09	49.49	44.40	56.67	51.38	50.19	63.89	51.81
SiO2	18.22	13.74	9.30	7.86	4.59	4.24	13.17	26.56
Fe2O3	11.96	16.80	23.86	17.99	20.02	20.94	2.12	1.45
TS	4.56	1.00	1.70	0.12	0.09	0.14	1.29	0.72
TiO2	2.44	2.57	1.88	2.53	2.46	2.32	3.50	3.09
Al/Si	2.64	3.60	4.77	7.21	11.19	11.84	4.85	1.95
LOI	13.34	13.74	19.08	13.01	17.66	18.20	12.20	9.03

Table S3. Major (%), trace and rare earth elements (ppm) of Jiujialu Formation Al-bearing rock series, and underlying Cambrian Qingxudong Formation dolomite, samples from the Xiaoyuan bauxite deposit.

Sample	**Xy01**	**Xy02**	**Xy03**	**Xy04**	**Xy05**	**Xy06**	**Xy07**	**Xy08**	**Xy09**	**Xy10**
Al2O3	30.97	65.55	71.62	64.06	61.51	65.35	69.55	46.84	25.13	12.03
SiO2	36.00	15.56	7.65	13.26	16.33	12.56	9.76	32.80	26.87	12.20
TS	7.49	0.03	0.18	2.66	1.54	0.44	0.12	0.29	17.55	0.15
Ca	0.06	0.02	0.01	0.04	0.02	0.04	0.01	0.03	0.04	1.67
Fe	9.83	0.10	0.32	0.25	1.45	0.40	0.19	1.01	18.70	39.70
K	4.34	2.96	1.38	4.24	1.86	4.23	0.76	4.20	4.62	0.67
Mg	0.41	0.09	0.04	0.17	0.06	0.19	0.02	0.12	0.19	1.32
Na	0.06	0.04	0.02	0.04	0.04	0.07	0.03	0.05	0.06	0.03
Ti	0.68	0.99	1.35	1.45	1.74	1.22	2.13	0.96	0.58	0.34
As	83.00	33.60	1.30	4.20	64.40	18.00	1.90	6.80	67.00	16.50
B	295.00	210.00	188.00	305.00	218.00	388.00	220.00	300.00	291.00	71.00
Ba	70.00	1510.00	1340.00	1560.00	960.00	1590.00	840.00	1310.00	20.00	940.00
Cr	93.00	103.00	104.00	75.00	77.00	69.00	80.00	87.00	49.00	40.00
Cu	189.50	9.60	2.60	41.50	224.00	191.00	229.00	91.50	209.00	4.40
Ga	23.30	39.00	42.50	36.80	36.70	31.80	25.70	35.10	32.20	22.30
Hf	6.00	9.30	13.20	13.10	12.50	9.20	14.90	7.30	4.20	1.80
Li	670.00	120.00	17.90	533.00	12.10	17.60	1.30	8.90	10.30	94.10

Nb	26.50	42.90	57.40	57.90	65.70	46.30	82.10	37.00	20.60	12.20
Ni	159.50	12.40	2.90	51.80	588.00	52.30	6.60	31.00	51.80	31.60
P	140.00	80.00	130.00	450.00	690.00	760.00	590.00	840.00	440.00	2430.00
Pb	525.00	11.40	15.80	46.20	211.00	114.00	57.40	76.80	38.70	23.80
Rb	26.60	24.20	13.60	29.90	26.50	55.20	10.20	58.90	73.20	21.20
Sc	26.80	36.40	26.60	45.80	22.70	48.70	12.20	24.80	34.50	13.40
Sr	55.10	30.90	35.60	276.00	362.00	523.00	247.00	725.00	386.00	3920.00
Ta	2.07	3.29	4.47	4.57	5.19	3.65	6.15	2.85	1.54	0.92
Th	8.92	29.60	21.90	39.30	43.30	53.40	34.20	34.50	19.85	17.45
V	65.00	121.00	109.00	134.00	86.00	95.00	65.00	109.00	546.00	144.00
Y	7.00	19.00	12.40	22.00	29.20	39.10	21.40	26.50	63.00	33.80
Zr	213.00	313.00	414.00	394.00	409.00	304.00	490.00	244.00	160.00	61.50
ΣLREE	30.52	23.44	36.18	388.34	610.65	810.99	273.29	641.99	236.37	195.14
ΣHREE	9.26	16.14	10.95	23.68	29.43	48.56	21.22	29.79	48.77	29.82
ΣREE	39.78	39.58	47.13	412.02	640.08	859.55	294.51	671.78	285.14	224.96
EU*	0.47	0.43	0.52	0.76	0.56	0.61	0.55	0.70	0.76	0.75
CE*	1.53	1.44	1.15	1.42	1.24	0.75	1.08	0.90	1.19	0.87
(La/Yb)N	1.12	0.65	1.87	9.83	16.04	21.04	9.87	23.52	4.62	8.93
(La/Sm)N	1.47	1.08	2.53	4.97	5.44	3.21	3.83	3.79	1.50	2.01
(Gd/Yb)N	0.47	0.63	0.54	0.87	1.03	2.42	0.97	2.10	2.51	3.07

Sample	Xy11	Xy12	Zk5123-1	Zk5123-2	Zk5123-3
Al2O3	21.18	21.23	56.67	51.38	50.19
SiO2	23.92	22.68	7.86	4.59	4.24
TS	0.05	0.34	0.12	0.09	0.14
Ca	2.26	8.78	0.04	0.48	0.25
Fe	18.45	24.10	8.39	14.85	11.50
K	3.21	0.03	0.02	0.10	0.08
Mg	1.52	1.01	0.61	0.64	0.65
Na	0.07	0.02	0.03	0.02	0.02
Ti	0.63	0.08	1.59	0.96	1.16
As	2.70	1.70	48.60	3.60	1.60
B	154.00	12.00	-	-	-
Ba	970.00	790.00	30.00	60.00	50.00
Cr	95.00	10.00	90.00	72.00	98.00
Cu	0.20	5.10	91.90	7.30	38.70
Ga	31.70	11.75	29.90	22.10	26.60
Hf	3.20	0.70	11.00	7.10	8.40

Li	159.50	88.30	240.00	139.50	141.50
Nb	23.40	3.40	58.90	37.60	44.50
Ni	49.50	53.40	43.50	34.80	29.70
P	1500.00	290.00	430.00	580.00	870.00
Pb	18.30	50.80	60.10	32.10	18.20
Rb	35.60	0.60	0.10	1.60	1.40
Sc	17.80	10.80	34.80	49.60	41.60
Sr	1595.00	3040.00	200.00	199.50	253.00
Ta	1.75	0.20	4.49	3.08	3.34
Th	17.55	3.72	33.90	48.80	49.60
V	99.00	170.00	123.00	115.00	133.00
Y	37.10	27.80	18.10	39.30	33.50
Zr	111.50	35.10	356.00	225.00	277.00
ΣLREE	209.68	34.59	513.00	1283.56	1160.09
ΣHREE	33.75	18.63	93.41	201.67	160.90
ΣREE	243.43	53.22	606.41	1485.23	1320.99
EU*	0.71	0.94	0.56	0.57	0.59
CE*	1.18	1.24	1.32	1.11	1.60
(La/Yb)N	6.35	1.43	10.30	17.20	16.03
(La/Sm)N	1.77	0.80	4.34	3.42	4.23
(Gd/Yb)N	2.84	2.03	0.98	2.11	1.72

ΣREE = ΣLREE+ΣHREE; ΣLREE = Σ(La–Eu); ΣHREE = (Gd–Lu); Ce/Ce* = (2Ce/CeN)/(La/LaN + Pr/PrN); Eu/Eu* = (2Eu/EuN)/(Sm/SmN + Gd/GdN); (La/Yb)N = (La/LaN)/(Yb/YbN); (La/Sm)N=(La/LaN)/(Sm/SmN); (Gd/Yb)N = (Gd/GdN)/(Yb/YbN); N: normalization of chondrite, normalization factors are from Sun and McDonough (1989)

References

Sun, S.S.; McDonough, W.F. Chemical and isotopic systematics of oceanic basalts: implications for mantle composition and processes. *Geological Society, London, Special Publications* **1989**, 42(1), 313–345.