

Fig. S1纯铝试剂沉淀样品的表征结果(a) XRD图谱, (b)SEM图.

Table S1 Summary of Zn recovery from Zn-bearing waste solution and/or solid

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| No. | Zn-bearing waste | Major composition | Ref. |
| 1 | Electroplating sludge | 6.4% Cu, 5.1% Ni, 1.6% Zn, 5.3% Cr and 1.1% Fe | (Li et al. 2010) |
| 2 | Electroplating sludge | 1.3% Cu, 0.2% Pb, 37.5% Zn, 23.6% Cr, 1.6% Ni and unknown content of Fe/Al | (Peng and Tian 2010) |
| 3 | Electroplating sludge | 18% ZnO, 16.3% CuO, 14.6% Cr2O3, 7.8% Fe2O3, 7.5% SO3, 4% Cl, 1.8% Al2O3, 1.5% SiO2, 1.3% P2O5 and 1% CaO | (Mao et al. 2018) |
| 4 | Electroplating sludge | 5.9% SiO2, 4.5% Al2O3, 17.7% Fe2O3, 6.6% Cr2O3, 2.6% NiO, 2.2% ZnO, 27.9% CaO, 12.3% P2O5 and 20.3% SO3 | (Ramachandran and Kikukawa 2000) |
| 5 | Electroplating sludge | 84.6% water, 6.7% Cr, 4.7% Fe, 7.9% Ni, 17.8% Cu, 4.9% Zn, 5.5% Ca and 3.8% S | (Chen et al. 2008) |
| 6 | Electroplating sludge | 27.5% Fe2O3, 2.7% CaO, 1.5% P, 10.3% Cr2O3, 13.3% ZnO and 1% NiO | (Zhang et al. 2018) |
| 7 | Electroplating sludge | 1.8% Al, 3.7% As, 9.5% Ba, 2.5% Ca, 5.8% Cd, 4.9% Cr, 5.1% Cu, 7.2% Fe, 3.6% Mn, 7.1% Ni, 5.4% Pb, 7.4% Si and 6.7% Zn | (Huang et al. 2013) |
| 8 | Electroplating sludge | 45.9% Fe, 0.4% Al, 17.3% Zn and 0.1% Mg | (Cao et al. 2017) |
| 9 | Electroplating sludge | 11.4% Cu, 10% Ni, 1.6% Zn, 1.4% Cr and 1.3% Fe | (Li et al. 2011) |
| 10 | Electroplating sludge | 5.1% Cu, 4.7% Ni, 2.8% Fe, 6% Cr and 3.4% Zn | (Yan et al. 2019) |
| 11 | Electroplating sludge | 1.7% Al2O3, 1.2% SiO2, 15% SO3, 1.4% Fe2O3, 23.8% CuO, 12.9% ZnO, 3.6% NiO and 16.4% Cr2O3 | (Li et al. 2014) |
| 12 | Electroplating sludge leachate | 36.3 g/L Cu, 3.15 g/L Zn, 1.15 g/L Ni and 1.6 g/L Fe | (Dang et al. 2012) |
| 13 | Electroplating sludge | 2.7% Fe, 48.9% Zn, 1.9% Cu, 9.8% Ca, 8.2% Mg and 1% Na | (Wódzki et al. 1999) |
| 14 | Electroplating sludge | 25% Cu, 6% Zn, 2% Ni, 4% Sn, 10% Fe, 6% Ca and 2.5% Al | (Tian et al. 2020) |
| 15 | Electroplating sludge | 26.5% Fe, 12.6% Zn, 4.8% Cr and 1.6% Si | (Zhang et al. 2019) |
| 16 | Electroplating sludge | 25.7% Cu, 0.4% Fe, 4.8% Ni, 1.2% Pb, 1.9% Zn and 4.7% Ca | (Kuchar et al. 2006) |
| 17 | Electroplating sludge | Wet sludge contained 3% Cu, 1.9% Ni, 0.2% Zn, 0.3% Fe, 1% Cr and 0.3% Ca | (Wang et al. 2018) |
| 18 | Electroplating sludge leachate | 0.4 g/L Zn, 0.008 g/L Mn, 0.2 g/L Fe and 0.001 g/L Cd | (Mahandra et al. 2017) |
| 19 | Electroplating sludge | 0.5% Al, 7% Cr, 4.2% Cu, 1.5% Fe, 9.5% Ni, 4% P, 5.7% S, 28% Si and 3% Zn | (Silva et al. 2005) |
| 20 | Electroplating sludge | 3.7% Cu, 3.2% Zn, 3.6% Cr, 1.2% Ni and 10.1% Fe | (Zhu and yANG 1995) |
| 21 | Electroplating sludge | 14.6% Cu, 13.2% Ni, 2.2% Cr, 0.6% Mg, 0.3% Zn and 13.5% Ca | (Chen et al. 2001) |
| 22 | Electroplating sludge | 19.2% Fe, 7.9% Cr, 2.4% Al, 0.4% Cu, 0.8% Zn and 0.4% Ni | (Wanpeng et al. 1998) |
| 23 | Flat panel display waste | 1% Al, 0.4% Cu, 2.2% Fe, 0.3% Y and 0.4% Zn | (Yang et al. 2016) |
| 24 | Fluorescent lamp waste | 0.1% Al, 0.2% Ba, 7% Ca, 0.3% Fe, 0.7% Y and 0.1% Zn | (Tunsu et al. 2016) |
| 25 | Electroplating sludge | 18.6% Zn, 5.7% Fe, 6.4% Al, 5.8% Ca and 1.2% Si | (Qu et al. 2021) |
| 26 | Electroplating sludge | 6.7% Zn, 4.3% Fe, 0.9% Ni, 11.9% Ca, 1.5% Cu and 15.5% Cr | (Wu et al. 2019) |
| 27 | Zinc hydrometallurgy residue | 9.6% Zn, 30.8% Fe, 8.6% S, 38.7% O, 3.3% Si, 1.2% Cu and 1.3% Si | (Hu et al. 2015) |
| 28 | Electric arc furnace | 3.2% SiO2, 1.1% MgO, 34.5% Fe2O3, 4.1% MnO, 45.6% ZnO, 6.1% CaO and 0.6% Cr2O3  | (Omran et al. 2020) |
| 29 | Zinc plant residue | 11.3% Zn, 24.6% Pb and 8.3% Fe | (Turan et al. 2004) |
| 30 | Electroplating wastewater | 100 mg/L Zn | (de Luna et al. 2019) |
| 31 | Electroplating wastewater | 100–300 mg/L Zn | (Venkatesan and Meera Sheriffa Begum 2008) |
| 32 | Electroplating wastewater | 500–2500 mg/L Zn | (Rajasimman et al. 2021) |
| 33 | Rinsing wastewater | 0.7 M Zn | (Pigaga et al. 2002) |
| 34 | Electroplating wastewater | 562 mg/L Zn, 38 mg/L Fe and 7 mg/L Cr | (Elez et al. 2008) |
| 35 | Electroplating wastewater | 251.2 mg/L Zn, 265.2 mg/L Cr | (Sze and Xue 2003) |
| 36 | Rinsing wastewater | 1300 mg/L Zn, 4400 mg/L Fe, 50 mg/L Ag and 20 mg/L Cr | (Matlalcuatzi and Nava 2012) |
| 37 | Washing water of electroplating plants | 100 mg/L Zn | (Dulneva et al. 2020) |
| 38 | Multimetal solution obtained from the incineration of Saccharomyces cerevisiae contaminated biomass | 0.2g/L Zn, 2.8g/L Ni, 0.4g/L Cu and 3.8g/L Cr | (Machado et al. 2011) |
| 39 | Electroplating rinse bath solution | 1.9 g/L Zn | (Kul and Çetinkaya 2009) |
| 40 | Zn-plating rinse water | 84.1 mg/L Zn | (Fu et al. 2021) |

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