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RESEARCH ON IN-SITU RECOVERY TECHNOLOGY OF HOT-DIP GALVANIZED DROSS

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1 INTRODUCTION

Hot-dip galvanizing industry is the largest consumption field of metal zinc with more than 40% of the total annual output of metal zinc in the world. In the process of hot galvanizing, the dross accounts for about 10% ~ 15% of the total zinc input. At present, the recovery methods of the dross mainly include electrolytic preparation of cathode zinc, evaporation condensation or vacuum distillation recovery of zinc, chemical preparation of zinc salt, etc.3. These methods can successfully recover the metal, but have some notable limitations such as large capital investment, waste of certain energy or complex process which is not the best way to recover the metal from the dross. Super-gravity, as a way to greatly strengthen the mass transfer processes, can be used to achieve the high-efficiency recovery and utilization of hot-dip galvanized dross.

2 METHODS

For the supergravity separation experiment, the hot-dip dross sample was put into a designed graphite filter crucible, which was composed of two small crucibles with the same inner diameter of 21 mm. Twenty holes with a diameter of 1 mm were evenly distributed at the bottom of the upper crucible, and a layer of CFF was laid at the bottom of the upper crucible as the filter medium. The graphite crucible was then heated at the target temperature in the heating furnace of the centrifugal device shown in Fig. 1 for 25 min. After the sample was completely melted, the centrifugal device was turned on, and the speed was adjusted to achieve isothermal separation. The centrifugal unit was shut down after achieving the desired separation time. Then, the graphite crucible was removed from the furnace and cooled in the air. Then, the residue and filtered alloy were collected from the upper crucible and the lower crucible respectively to prepare for further characterization. Each experiment was repeated three times.

3 RESULTS

This paper is to examine the feasibility with super-gravity to recover metal from hot-dip galvanized dross. The dross particles with small amount of intermetallic compound can be removed from the molten alloy bath under super-gravity field, and the purified metal could be directly returned into the bath for the production. In this study, the influences of gravity coefficient (G), separation time (t) and separation temperature (T) on the separation efficiency were investigated as well as the mechanism of super-gravity separation of galvanized dross, which can reduce the amount of zinc dross by more than 60% and achieve a reduction in zinc loss from 17% to less than 7%.

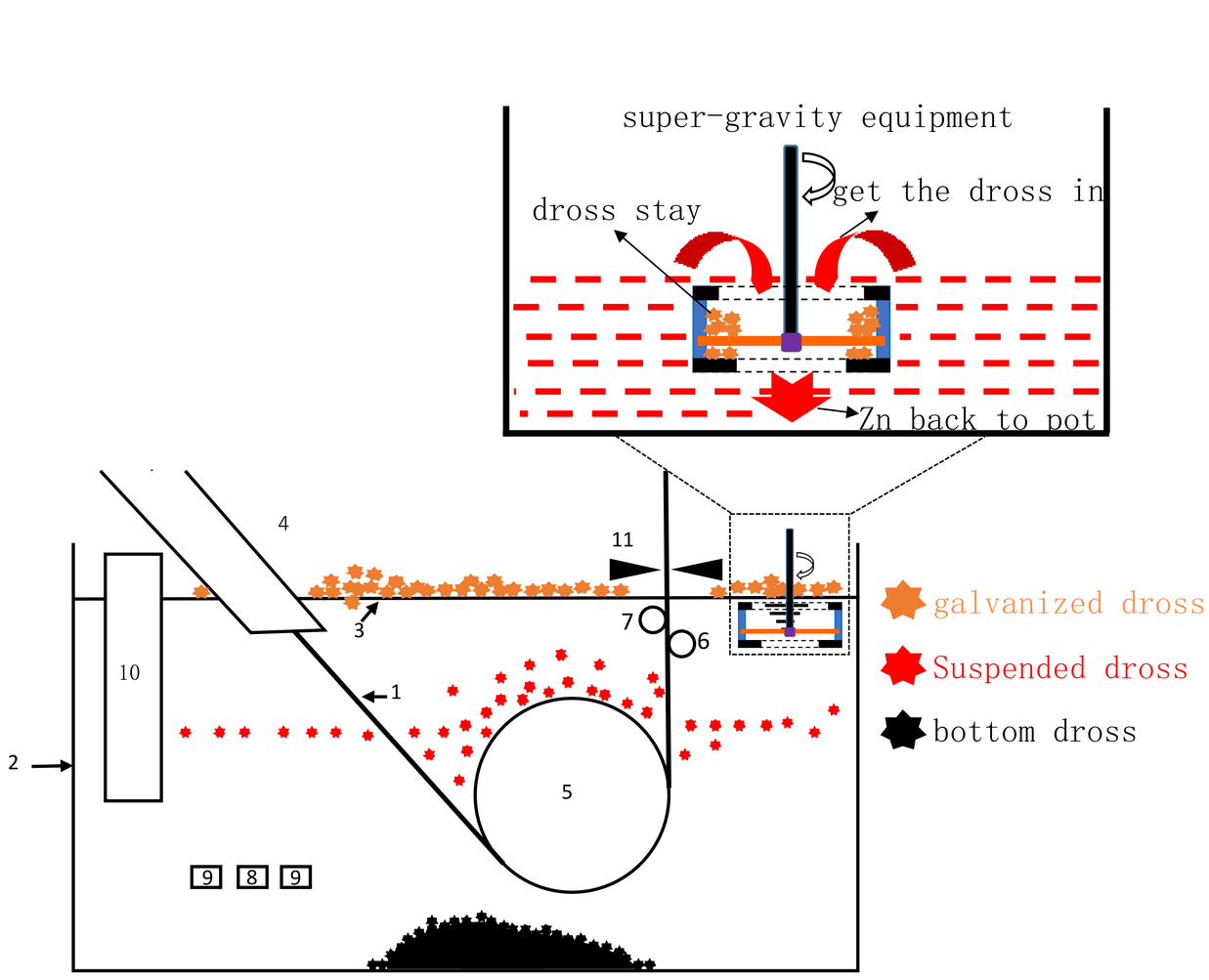

FIG 1 – Schematic diagram of online recycling and utilization of zinc dross (1-strip steel, 2-zinc pot, 3-zinc liquid level, 4-furnace nose, 5-sinking roller, 6-correction roller, 7-stabilization roller, 8-induction heater outlet, 9-induction heater inlet, 10-zinc ingot, 11-air knife)

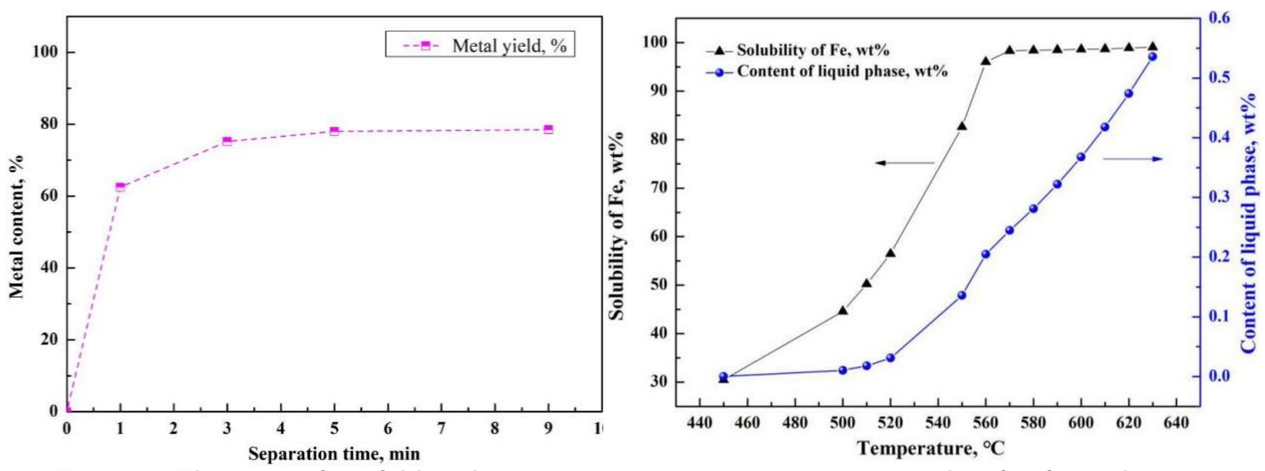

FIG 2 – The metal yield by the super-gravity separation and calculate the solubility and liquid phase content of iron in the slag system

4 CONCLUSION

(1) It examined the feasibility with super-gravity to recover metal from hot-dip galvanized dross.

(2) It was shown that it can reduce the amount of zinc dross by more than 60% and achieve a reduction in zinc loss from 17% to less than 7% by the super-gravity equipment.

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