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RESEARCH PAPERS

碳酸钙在化学镀表面上的结垢与脱除

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摘要 The scaling process of calcium carbonate on a low-energy heat transfer surface—electroless plating surface was investigated in a simulated cooling water system. Owing to the very low surface energy, the electroless plating surface exhibited less scaling susceptibility. A longer induction period and a lower scaling rate were obtained on the low-energy surface compared to copper surface under identical conditions. The calcite particles obtained on the electroless plating surface during the induction period were larger in size than those on copper surface because fewer crystals formed and grew at the same time on the low-energy surface. With increasing surface temperature, the induction period reduced and the scaling rate increased for the low-energy surface. When initial surface temperature was fixed, an increase in fluid velocity would reduce the induction period and increase the scaling rate due to the diffusion effect. However, when the heat flux was fixed, an increase in fluid velocity would decrease the surface temperature, and lead to a longer induction period and a lower scaling rate. The removal experiments of calcium carbonate scale indicated that during post induction period, the detachment was not obvious, while during the induction period, apparent removal of crystal particles was obtained on the electroless plating surface owing to the weak adhesion force. The more frequently the transient high hydrodynamic force acted, the more the detached crystal particles were.

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Scaling and Removal of Calcium Carbonate on Electroless Plating Surface

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Abstract The scaling process of calcium carbonate on a low-energy heat transfer surface—electroless plating surface was investigated in a simulated cooling water system. Owing to the very low surface energy, the electroless plating surface exhibited less scaling susceptibility. A longer induction period and a lower scaling rate were obtained on the low-energy surface compared to copper surface under identical conditions. The calcite particles obtained on the electroless plating surface during the induction period were larger in size than those on copper surface because fewer crystals formed and grew at the same time on the low-energy surface. With increasing surface temperature, the induction period reduced and the scaling rate increased for the low-energy surface. When initial surface temperature was fixed, an increase in fluid velocity would reduce the induction period and increase the scaling rate due to the diffusion effect. However, when the heat flux was fixed, an increase in fluid velocity would decrease the surface temperature, and lead to a longer induction period and a lower scaling rate. The removal experiments of calcium carbonate scale indicated that during post induction period, the detachment was not obvious, while during the induction period, apparent removal of crystal particles was obtained on the electroless plating surface owing to the weak adhesion force. The more frequently the transient high hydrodynamic force acted, the more the detached crystal particles were.

Key words scaling; induction period; removal; electroless plating surface

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