

Effects of static magnetic field on solidification of alloys

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Effect of static magnetic field on solidification of alloys has been an interesting topic for a long time. Over recent two decades, the research in this field has achieved a lot progress. Here some important research works in this field are reviewed. Static magnetic field has been shown apparent influence on surface tension and diffusion in alloys which may cause changing in undercooling for nucleation of crystal even though in the alloy with feeble magnetic property. It is shown that the thermo-electric magnetic convection(TEMC) in the molten alloy solidifying in a static magnetic field is apparent and influences the solidification significantly. The TEMC may lead to change in dendrite spacing and shape of the solid/liquid interface. In addition, thermos-electric magnetic stress(TEMS) in the solid is generated which may produce instability of the solid/liquid interface and fracture the dendrite arms. The magnetic force due to the gradient of the magnetic field may re-orientate the crystal and induce stress in the crystal also. The gradient magnetic force can control the movement of particles in the liquid metals. Finally, the further work in this field is discussed.