acoustic microscopy

Metal alloy

Differences in the mechanical properties of a solid are measurable as a change in the echo signal of the reflected acoustic wave. Growth-related anisotropies of crystal structures, such as dendrites or the intermetallic phase in the residual eutectic can be detected acoustically on polished metal surfaces. At high frequencies (f>1.oGHz) the intermatallic deposits can be seen by the dark needles, the dentrites by their "leaf-like" shape (Fig. a).
The greater penetration depth obtainable at low frequencies (f<1.0 GHz) reveals subsurface cavities (Figs. b and c).
Subsurface defects such as cracks, inclusions, pores and stress often cause interference phenomena in the acoustic image, even when they are smaller than the wavelength and therefore beyond the limit of resolution.

Fig. a: Polished cross section of an alloy with intermetallic deposits and impurities
Frequency: 1.1 GHz
Image width: 312 µm

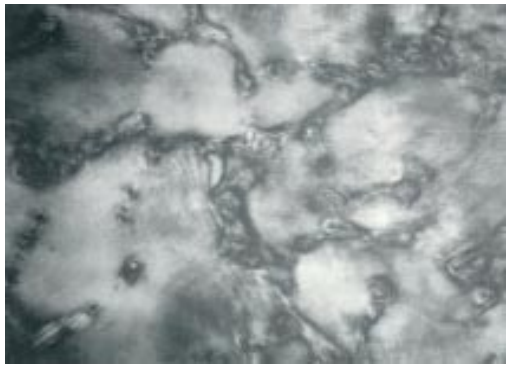

Fig. b: Polished cross section of an alloy with intermetallic deposits and impurities
Frequency: 800 MHz
Image width: 0.5 mm

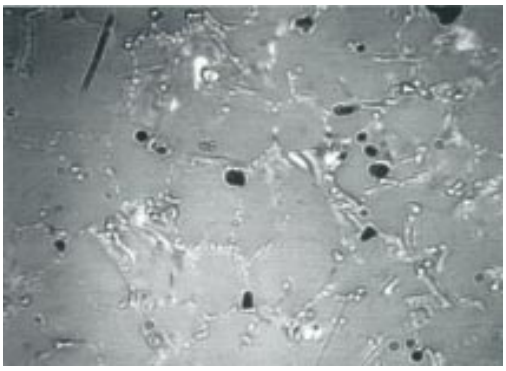

Fig. c: Polished cross section of an alloy with intermetallic deposits and impurities
Frequency: 400 MHz
Image width: 1 mm

Fig. c: Polished cross section of an alloy with intermetallic deposits and impurities, defocussed
Frequency: 1.1 GHz
Image width: 0.5 mm