

Acoustic Microscopy

Glass fibre reinforced composites

Many composites have a polymer matrix (polyesters, epoxy resins, polyamides, etc.) and mostly stiff, rigid fibres (glass, carbon, aramide, etc.).

They are often used for electric appliances, boat and car bodywork and for aircraft components. They have the advantages of low production costs of parts which, in spite of their complex shape, can be produced in one piece by injection moulding, for example.

The acoustic microscope supplies contrasty images due to the usually large acoustic impedance differences between the fibre and matrix. The course of the fibre in the matrix can be derived from characteristic interference phenomena from a surface image.

Images of fibre fractures supply information on force mechanisms between fibre-to-fibre and fibre-to-matrix interfaces.

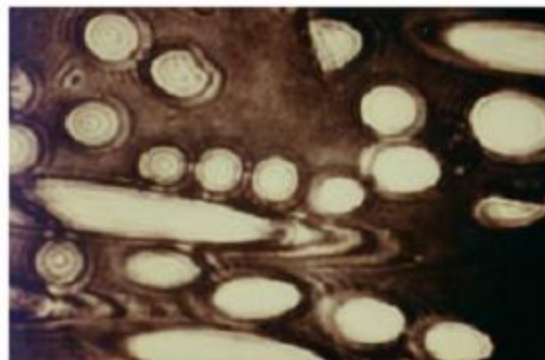


Fig. a: Defect glass fibre in a polymer matrix, entering the matrix at a slight inclination to the surface. Frequency 1GHz

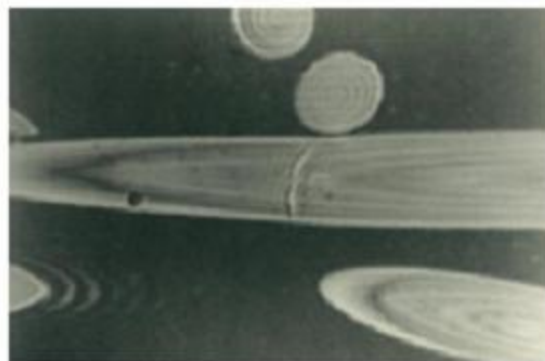


Fig. b: Glass fibres running vertically and obliquely to the surface. In the centre of the picture a crack in a glass fibre can be seen. Image width corresponds to 62,5 µm

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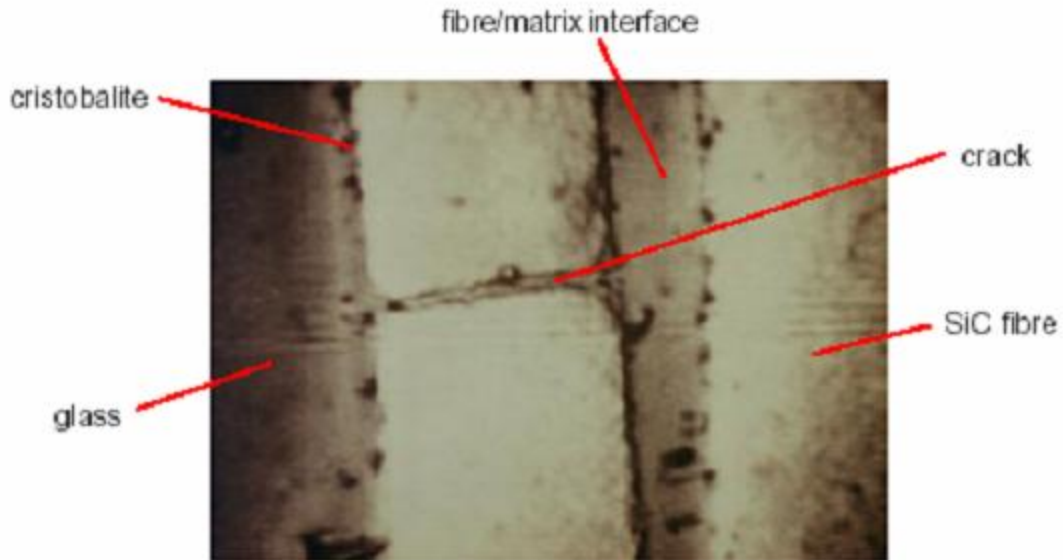


Fig a: SiC fibre in glass-ceramic matrix. SAM image of a single fibre with crack. Cristobalite grains in the denitrified matrix are visible. Frequency 1,5 GHz



Fig b: Fibre reinforced in cement

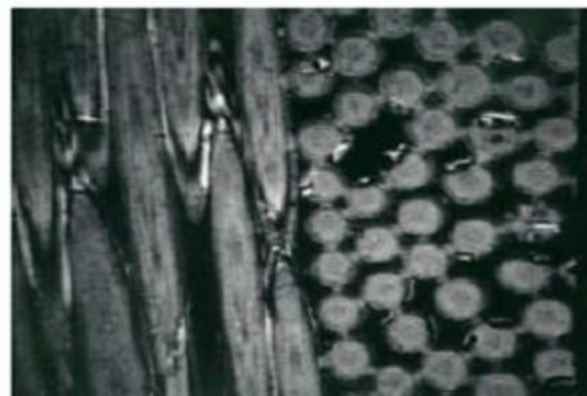


Fig c: Fibre with 1250x magnification