REVERSIBLE DOMAIN REVERSAL IN TRIGLYCINE SULPHATE CAUSED BY A LASER BEAM

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Abstract. — With the advent of lasers it is now possible to produce local thermal shocks and we shall describe some experiments where by looking very accurately at the pyroelectric signal, we have seen some evidence of predeterminate nucleation sites. We have also been able to locate with a microsecond accuracy the time of domain creation or destruction which is obviously impossible with the naked eye, in the new experiments of etch patterns.

Text. — A He-Ne laser spot is focussed on a T. G. S. plate. Figure 1 shows a normal pyroelectric signal [1]. Figure 2 shows an extra-signal which is triggered when a nucleation site is reached by the thermal wave. The case of figure 2 is the case of a good crystal where the extra-signals is seen on every place and appears immediately after illumination. Generally some delay is needed corresponding to some distance between the laser spot and the nucleation site [1]. Figure 3 shows several extra-signals corresponding to different nucleations sites. It is seen on figure 2 that polarization reversal of a domain issued from the nucleation site is practically instantaneous (in fact photographs with a higher time resolution show a 20 μs rising time) and persist as long as is kept the new thermal equilibrium. The extra-signal corresponds to the growing of the cigar shaped domain parallel to the pyroelectric axis described by Chynoweth. The lateral extension by domain wall motions is not observed in those experiments where the heating is localised on a macroscopic surface. This one direction growing is reversible. It is impeded by internal fields developed either by impurities or 6 irradiation. It is easier close to the Curie temperature where the coercive field is smaller.

References