3rd European Meeting on Ferroelectricity (EMF-3)

Zurich, Switzerland, 22-26 September 1975

The Third European Meeting on Ferroelectricity was held in Zürich. About 260 participants assembled in the new and well equipped lecture halls of the Physics Campus of the Swiss Federal Institute of Technology (ETH) on Hönggerberg. The previous conferences of this series took place in Saarbrücken (1969) and Dijon (1971). It is planned to have a European Meeting on Ferroelectricity (EMF) every four years, followed by an International Meeting on Ferroelectricity (IMF) in between. The EMF meetings have up to now been organized on an "ad hoc" basis without any permanent organization standing behind. For the future the desire was expressed by the majority of participants to seek some connection with the European Physical Society. To this end a Steering Committee was set up, which discussed the various possibilities of a representation within EPS. It was decided not to form a new section at the moment, but rather to have the interests of people in the field of ferroelectricity and phase transitions represented by a few delegates who are proposed for cooption on the board of the section "Semiconductors and Insulators" of the Condensed Matter Division.

About fifteen years ago, ferroelectrics was a relatively small class of solid materials, studied for the sake of their own peculiar properties. Today this field has grown by a number of phenomena and materials and embraces among other things also the large area of phase transitions and critical phenomena. Cochran's fundamental concept of the "soft phonon mode" has been a strong impact in this direction. This trend was reflected by the selection of 14 invited talks and about 175 contributed papers presented at this meeting. More than half of them were concerned with basic studies of the ferroelectric phase transition, both theoretically and experimentally.

At the most fundamental end of the spectrum a review by A. Bruce (University of Edinburgh), entitled "The Theory of Structural Phase Transitions and Critical Phenomena" has to be mentioned. It led immediately into the field of the renormalization group and made it clear, also for the experimentalists, on what basic quantities the asymptotic behaviour close to the critical point depends, parameters that are called "relevant". The search for the soft phonon mode by light, X-ray, gamma-ray, and neutron scattering, and by infrared reflectivity was the subject of a whole session. The central peak, found in 1971 by neutron scattering in the dynamic structure factor of strontium titanate, has since then attracted the interest of many investigators. It was also at this conference the central subject of several theoretical papers and has been touched in some experimental studies on the dynamics of phase transitions by nuclear magnetic resonance. A very fruitful idea, in my opinion, was brought to the audience by T. Schneider (IBM Zürich Research Laboratory), who found in his numerical molecular-dynamics studies of two-dimensional models a new low-frequency excitation branch originating from waves of clusters of locally ordered regions. The connection of these cluster waves and their lifetime to the central peak dynamics became evident.

One notion completely new at a ferroelectrics conference was that of "dimensionality ($d \neq 3$)", not only in a theoretician's model, but practically realized and measurable in a series of materials ($SnCl_2.2H_20$, Cu $(HCOO)_2.4H_2O$, $(CH_3NH_3)_2MnCl_4$, etc.). Using squaric acid as an example, J. Feder (University of Oslo) demonstrated the effects a reduced dimensionality can have upon critical properties: different critical exponents and a wider temperature region when critical effects are observable. The fact that a few of the materials discussed at this conference are not ferroelectric but are to be listed in the more general class of materials showing structural phase transitions, clearly demonstrates, how the scope of a ferroelectrics conference has widened, and that today it presents a forum also for work in areas of structural phase transitions other than ferroelectric.

On the other hand, the "classical" properties of ferroelectrics, such as dielectric, piezoelectric and pyroelectric properties, domains and hysteresis, also found sufficient attention in a number of sessions. The continuing importance of these properties for industrial applications was stressed by K. H. Härdtl (Philips Research Laboratory, Aachen) in his review on ferroelectric ceramics used in electronic devices. One whole session was devoted to crystal growth, three others to materials. The importance of optical effects in ferroelectrics and its use for information storage was covered in an invited talk by F. Micheron (Central Research Laboratory Thomson - CSF, Orsay) and in a subsequent session of contributed papers.

Generally speaking, there was a good balance between fundamental studies and applications, reflecting the fact that the field of ferroelectrics can excite both, yielding industrial products and offering challenging questions to basic research.

I had the impression that every participant appreciated the excellent and careful planning of the conference and the social programme, done by the local Organizing Committee. A climax was the dinner held at Lenzburg Castle. More like an experiment was the event scheduled for one afternoon: a "boat ride with discussions" on the Lake of Zürich. Four parallel discussions of scientific and technical questions took place. A black board and two coordinators for each session were supposed to act as growth centres. Owing to the fine weather there was, however, a conflict in many a participant's mind : taking part in the discussion or enjoying the magnificent view over the lake. Some of the participants were more interested in the former, others in the latter.

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