
Concluding Remarks

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Concluding remarks

BY C. HILSUM, F.R.S.

The past two days have been hectic, heavy with compressed information. I have no intention of burdening you with more technicalities, nor of attempting to summarize the crucial points, for there are too many. Instead, we should stand back from the detail, and try to assess what has been achieved in our field.

We must first accept that the word 'applications' in the title of our meeting really means 'display devices', for today we have few other practical uses of liquid crystals. Nevertheless, liquid crystal displays have an annual world market of £150 million, and this is predicted to grow by 50% per year for the next 5 years. Three years ago rival subtractive technologies, electrophoresis, electrochromism and electroplating were potential competitors, with much activity in research laboratories. Now their limitations have been exposed, and few discuss them. This domination of the field has been accompanied by an extension of our interest to all three types of liquid crystal. The nematic display is well established, and the newer uses of cholesterics and smectics have been discussed by a number of speakers. The wealth of possibilities is enormous, and this presents a danger, because our efforts may become too diffuse.

We should be comforted by the size of the display market, but more impressed with the growth. Most of this audience will realize that the differential has great significance for them. A static industry, though large, calls for little research. A dynamic industry needs new developments, new effects, new materials. Dr Scheffer was concerned about the ability – and willingness – of manufacturers to adopt new developments, such as the dyed phase-change display. Such caution is understandable. A manufacturer who has mastered a device technology with one material will be reluctant to try another. He will be even more resistant to a completely new device structure, unless this can readily lead to an expansion in his market. His profits are not raised if he simply substitutes one device he makes for another. But if the timing is right, new devices will find a place. The history of liquid crystals shows this, because they were ready when the market called for them.

It is not easy, nor perhaps helpful, to compare either academic progress or device invention in different fields, but we should remember that the first integrated circuit did not appear until 15 years after the transistor, and the MOSFET, the most widely used transistor today, was 2 or 3 years later still. It may be that we have not yet invented our l.c. MOSFET equivalent, nor isolated the electro-optic effect on which this magic device will be based. Moreover, our field need not continue to be restricted to displays. We are beginning to see thermochromics in a number of guises, and some ingenious ideas for optical signal processing involve liquid crystal components.

In 1975, at a Conference on Non-emissive Displays, my concluding address chided the participants for their pessimism about the future, and for limiting their horizons to displays for watches and calculators. My final sentence, 'Small men cannot look over high walls,' was never printed, probably because the editor of the Proceedings did not understand my meaning. During the past two days we have heard from tall men, and the obstacles seem much less impressive.

We have an industry that is firmly based, linked closely with distinguished academic research that is equally productive. I am sure you will leave now with a sense of optimism, and I have no doubts that your optimism is fully justified.

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