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Interview With Dr Andy Cumming, Director, Merck R&D UK

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Merck Ltd, based in Poole, Dorset, has for the past 25 years been the centre of liquid crystal materials research, development and manufacture in the UK. It therefore came as a great shock to many people to learn of the recent announcement (see Company News in this issue of *Liquid Crystals Today*) by Merck that from the end of 1998, production of liquid crystals at their West Quay Road plant would cease.

Pioneering research into liquid crystals was carried out at Merck (formerly BDH) from the early 1970s, in close collaboration with the Royal Signals and Radar Establishment (RSRE Malvern) and researchers at Hull University. The importance of liquid crystals for the future of the display industry was realized at an early stage of the research, and the subsequent investment in developing the technology enabled Merck to quickly emerge as the market leader in the supply of liquid crystal materials.

Research and development has continued to feature strongly in the company, leading to the award of two Queens Awards for Technology, one jointly with the RSRE and Hull University, for their part in developments within the industry. Recent research in Poole has concentrated on formulating mixtures for polymer dispersed liquid crystal applications, and on liquid crystal polymers.

Despite the unfortunate closure of the manufacturing plant in the UK, the Merck Group remain committed to their work in the field of liquid crystals, and intend to continue R&D after closure in the newly established organization Merck R&D UK. Dr Andy Cumming, the newly appointed Director of Merck R&D UK kindly agreed to be interviewed for *Liquid Crystals Today* to explain the changes taking place within Merck, and to outline the focus of their work in the future. Dr David Coates, the Chief Scientist for R&D, also joined the interview.

Erol: The recent announcement of the closure of liquid crystal production at Merck's Poole plant will have come as a shock to many liquid crystal scientists both in the UK and abroad. What were the reasons for the closure, and does it reflect a change in the scientific interests of Merck?

Cumming: Strong competition in manufacturing from Asia, particularly China has put the West Quay Road factory under intense pressure over recent years. That's one of the main reasons for the closure. Also new sectors based on PDLC and polymeric liquid crystals have not emerged sufficiently in recent years to provide the prospect of an immediate recovery of the financial situation of the factory. It's very sad, obviously for those who've worked in the production plant, but Merck remains committed to being the market leader in liquid crystals. And this is evident from the fact that the R&D is continuing in the new Merck R&D UK organization, and also by the fact that Merck has established a new company to make ITO coated glass for the LCD industries, Merck Display Technologies, based in Taiwan. So Merck hasn't changed its

scientific interests. It's just an unfortunate result of the commercial situation that manufacturing has had to be terminated here in Poole.

Erol: So you are still committed to liquid crystals?

Cumming: Yes, it's a very important business for Merck in the chemical sector.

Erol: With the competition from liquid crystal industries based in the Far East, how do you see the position of liquid crystal industries in Europe and North America?

Cumming: As far as the liquid crystal display (LCD) market is concerned, over many years companies producing LCDs in the Far East including Japan have gained a very strong position, dominating the world market. Regarding Europe and North America we think that only 5–10% of all LCD manufacturing is located in this part of the world. It's very difficult for companies that aren't based in south east Asia or Japan to compete. I think this is for two main reasons. One is the level of investment that has already been made in manufacturing plants. As displays have become more complex, there has been large investment necessary, and sometimes a very long term perspective is needed in order to justify such investments. And the second reason is the infrastructure, having all of the equipment and components suppliers available to you. However there are good possibilities for LCD manufacturers in Europe and the USA to serve their local markets in areas like avionics, automotive industries, industrial control, and the military, where maybe a small scale and more flexible local focus approach is an advantage over a less flexible ways of making displays. As far as the liquid crystal market is concerned, Merck is the market leader for liquid crystal mixtures world-wide. We've got two competitors in Japan, and several smaller ones in China. There are some differences, in that Merck is active and successful in all segments in the LC business world-wide, whereas these competitors tend to concentrate on supplying their home markets. And I think that speaking more generally about supplying materials to the LCD industry, if you're based in Europe, as Merck is, then you have to ensure that you're really focused on the mainstream market and that you have a really strong dedicated local organization in the market. For example, Merck has applications laboratories based in Japan, Korea and Taiwan and also local production facilities in Japan. So we are close to the market. I think also that



Left to right: Dr Andy Cumming (Director Merck R&D UK), Dr David Coates (Chief Scientist), Dr Simon Greenfield (Project Manager) and Mr Mark Verrall (Project Manager).

Europe and North America are excellent sources of R&D for new LC related technology.

Erol: What will be the role of the remaining Merck liquid crystal research group in the UK?

Cumming: The LC R&D is going to be part of the new organization, Merck R&D UK. And overall Merck R&D UK will report to the central business development unit in Merck KGaA, the parent company in Darmstadt. To start with, the UK group will carry out R&D in two main areas: that's liquid crystals and special inorganic materials. Our plan is to increase the number of staff employed to 50 from about 30. And we'll move to new laboratories in early 1999. It'll be in the south of England, not so far from here, because obviously that's important for the staff. In the medium term we're going to continue with the R&D we've been doing up until now in polymer based liquid crystal technologies, and research into liquid crystal polymer films. Dr Coates has got a special remit to work on new applications for liquid crystals.

Coates: This is short term, really to do with what is going on now. We've not been looking at mainstream topics over the past five or six years, i.e. the normal displays and applications of liquid crystals. It's likely that we are going to change and find ourselves doing more work with STN and TFT type materials to help our colleagues in Germany and Japan, by putting the maximum number of people on a particular topic. But we also intend to look at new ways in which we can use liquid crystals. One is as liquid crystal polymer films, which we've been working on for the last few years.

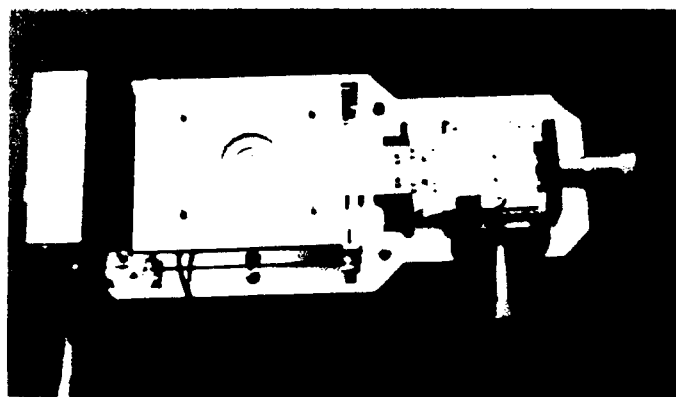
Cumming: It's very important for us that our customers and collaborators realize that we'll be continuing with our research interests. This means that we hope people will continue to bring their LC problems to us. Collaborations are essential to our way of working. On a practical level, Merck R&D UK will still be able to provide the full range of services as before, such as supplying sample quantities of interesting materials, and we remain committed to supplying the highest level of confidential scientific service in the future. So really the message is business as usual.

Erol: How will the research activities of the UK group relate to Merck research teams throughout the world?

Cumming: We're obviously going to have closer collaboration with the research and development teams in Merck KGaA in Darmstadt, and also we will work with the Merck Group companies that have a major interface with LC customers and LC researchers. As well as Japan, Korea and Taiwan, the USA is also important in that context, through our company EM Industries. We will have a number of joint projects both with Darmstadt and with the LC laboratories, on some of the more mainstream TFT and STN topics, along with a number of things that we've worked on in the past. And it's also very important for the liquid crystal group to have a very close link with the liquid crystal business unit in Darmstadt. For example we will have closer contact with process development and manufacturing in Darmstadt, so that the materials which are invented can be scaled up for production.

Coates: Most of our work that we've been talking about is in the liquid crystal business unit, but we also hope to work liquid crystals into

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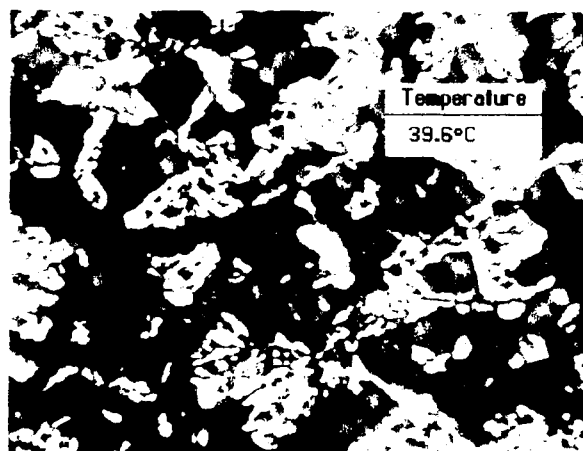
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Microscope video image of a liquid crystal between crossed polarizers. Sample temperature is recorded on the video image using the VTO1

other business units in the group. There are business units in Darmstadt which may also like to consider the liquid crystal state in new products and new applications. Some of these already exist today, and it's likely that we will find new ones in the future. So our research activities throughout the world could well be related to research teams that we've not previously worked with. In the future we expect to get more integrated into the Merck group as a whole, rather than just interacting with the liquid crystal business unit, as in the past.

Erol: What in your view are the special strengths of the Merck UK liquid crystal research group?

Cumming: Well very much that we have an excellent team with experience. It's a multi-skilled team with chemists, physicists, coatings people and polymer experts. These people are very important together with of course very experienced people like Dr Coates who has worked in liquid crystals since the early days of the modern phase. The second thing is Merck's ongoing commitment to R&D, and particularly to R&D in the UK. We have access to Merck's wealth of LC knowledge and patents, and a specialist knowledge of polymer related liquid crystals which has been built up mostly in the last five years. We've concentrated on our knowledge of coatings. We have close collaborations with universities and institutions within the UK, Europe and the USA. And I think there is a very strong customer focus, and a strong will to work with customers to solve their problems. This has been quite successful in the past: so it's a mix of those things.

Erol: Looking now at the wider perspective of liquid crystal research and development. Liquid crystal displays are now part of everyday life. What developments can the general public expect in the next few years?

Coates: In R&D we tend to think that things are going to happen much quicker than they do. We carry out the research, but it might take from five to seven years to actually put the results of the research into practice. It depends what it is of course, but it's a long time. So you've really got to look at trends. It is well known that over the next few years there will be larger screens, much brighter, with much wider viewing angles, they will also be faster, especially at lower temperatures. The main aim of course is to replace CRTs, monitors to start with and TVs later. It will happen, since there has been so much money spent on the research. We are coming under increasing pressure for the emissive types of technologies which could well be useful. There's going to be an increase in what we can use the displays for, so it's not that there's going to be fewer LCDs, it's just the whole arena's going to get a lot bigger. What would have been previously automatically an LCD screen may use another technology. We will see plastic displays that are flexible, not made of pieces of glass, as at present, but that's going to happen much later on, probably more than 7 years away. The other area where there will be developments is in colour reflective displays used for things like palm top computers. At the moment they are not very good, but enormous research effort is going into them, so it's likely that they will improve.

Cumming: One thing that I'd like to add, in the competition between the CRT and the LCD, we're really sure that any future sort of innovations which are used in LCD technology will be both better and cheaper. And I think that provides an enormous challenge to R&D. In order for the LCD makers to start to attack the CRT market for monitors, and colour televisions, performance of LCDs has to go up while making them simultaneously cheaper. I think that's one of the things that makes the LC research so exciting.

Erol: So how do you view the future for Merck liquid crystals, and in particular the Merck UK liquid crystal research group?

Cumming: Very positively. We will emerge from this period of change with a great deal of excitement for the future. We're looking forward to the move to our new laboratories. We've made a number of new senior appointments, including Dr Coates, Dr Greenfield, and Mr Verrall. The LCD market is predicted to grow at a huge rate, and we look forward to making a significant contribution in the future.

The following have accepted positions on the Editorial Board of *Liquid Crystals Today*, and contributions, comments or suggestions may be submitted to any member of the Editorial Board.

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