

The Royal Photographic Society

# **HOLOGRAPHY GROUP**

**Newsletter      December 2001**



Hologram produced from dot matrix master by  
Spatial Imaging Ltd

## Editorial

The festive season is with us once more. Our household is again busy wrapping its presents, using the seemingly endless roll of diffraction patterned plastic foil that Nigel Abraham gave me more than twelve years ago to celebrate the start-up of Applied Holographics's first wide-web (125 cm) hot rolling machines. I don't know how many thousands of kilometres they have turned out since, but a roll or two of the material has turned up in most card shops and stationers every Christmas since. Good luck to them, for a brilliant idea.

My sour little piece in the previous Newsletter about holography and plagiarism didn't go unnoticed. Holography News published an equally vituperative review by David Pizzanelli, and added some extracts from my piece. Before the News was published it was advised that some (fairly mild) words of mine might be misunderstood and considered offensive (!). So they were blacked out, probably leaving a worse impression, as readers would have to guess what I had written. But by the time Holography News appeared, a well-known US holographer had threatened to sue the publisher for breach of copyright. The publisher has now withdrawn the book, I am delighted to report.

I have begun work on the third edition of *Practical Holography*, having received a formal go-ahead from IoP Publishing. There is a fair amount of updating to do, and I will welcome any suggestions for inclusion (or exclusion). The format is going to be slightly different, more in keeping with the modern approach to textbooks and manuals, and, I hope, more user-friendly (horrible phrase).

By now you will all be aware that the RPS's magnificent Collection is going to be housed by the National Museum of Photography, Film and Television (NMPFT) in Bradford. I have been to Bradford several times recently, and have seen their new research department, where there are going to be staff who will assist any visitor who wishes to see material, and give positive help to researchers. All images are also accessible on computer screens, complete with relevant information. There are literally millions of images available. There are also displays of television, cine and still photographic equipment representative of a century and a half's technology. And what is on display represents only the tip of a vast iceberg, because there isn't room to show more than a tenth of what is in the equipment collection. The rest is warehoused.

BUT: There is scarcely any holography. I have talked to Amanda Neville, the Director, about this, and she is keen not only to have holograms of historical and/or aesthetic value in the Collection, but also to have a small permanent display of holograms in the main body of the Museum.

The Committee wish you all a very happy Christmas (if this Newsletter reaches you in time!), and everything you could wish for in the year 2002.

## Out and about

Not a lot happened in the first half of 2001, but things warmed up towards the end of the year. Andy Pepper staged an exhibition at Gallery 286, in which the main work was a series of watery holograms mounted on artistically corroded steel sheets (acetic acid, he told me). The Royal College of Art succeeded in killing our plans for this year's conference by somehow managing to double book the accommodation. The conference is now scheduled for 23 March 2002, at the same venue (fingers crossed). Our proposed beginners' holography workshop in the Midlands fell through, too, as I was summoned to the local hospital for some urgent dental work on that day. The workshop is now rescheduled for 2 March 2002 at the same venue, the Smethwick Photographic Society rooms in Oldbury, Birmingham. Please contact me if you want more information.

Mike Medora has now begun production of BB materials – plates only for the time being. Frank de Freitas of Allentown, PA, website [www.holoworld.com](http://www.holoworld.com), has an enormous amount of information about diode laser holography on his site. He has found a 35 mW diode laser with a stable beam and a coherence length better than 5 metres (sic) from Hitachi – not cheap, but an order of magnitude less costly than the equivalent in HeNe.

I was intrigued by an ad in the New Scientist a few weeks back about holographic materials and equipment, so I looked it up on the Internet. It turned out to be Geola's. It contains a huge amount of information. Try it: the address is [www.Myholostudio.com](http://www.Myholostudio.com).

Margaret Benyon, who received a well-deserved MBE in the New Year's Honours List, has been awarded an equally well-deserved Honorary Fellowship of the RPS. She has been holding an exhibition at Gallery 286, in which, in addition to holograms, she showed some large early stereoscopic paintings, anaglyphs of cable and wire compositions in red and green. The exhibition rated a full-page review in the Observer the following week, remarkable for its freedom for technical errors. (I forgive its confusion between microseconds and micrometres; presumably the journalist had been reading Stephen Hawking.)

Hans Bjelkhagen has also received a well-deserved accolade. For his work in colour holography he received the RPS's Saxby Medal. In addition he was awarded the distinctions of ASIS and FRPS. De Montfort University has created a Chair of Interferential Imaging Science, and last week Hans was installed as its first Professor. In the same department, Nick Phillips has now recovered from a long and debilitating illness, which wasn't helped by a bathroom accident in New York on 10 September, marooning him in that unfortunate city throughout the whole of that gruesome business.

People are still contacting me from time to time to ask if there are any copies of *Practical Holography* still around. The answer is yes, [www.amazon.com](http://www.amazon.com) run a second-hand service, and copies of the book are changing hands at around \$70–100 at present. But there is better news. Pearson Education, who have taken over from Prentice-Hall, have inaugurated a service whereby they will supply on order single reprints of any back number of a specialist book, mine included, and probably at a reduced price – albeit without a fancy cover or colour inserts. They have assured me that this service will continue until my new edition comes out, which I hope will be by next autumn.

Dr Chris Slinger runs a cell at QinetiQ (formerly DERA) in Malvern, carrying out research into the making of real-image, real-time computer-generated holograms. When I visited them recently, Chris told me about a system his team is evolving that allows enough information compression to produce an image of a model of a car in full parallax and to modify it in real time. The unit has a display model up and running, though it isn't quite the right thing: in fact it was made by Michael Klug's company Zebra. The research is being funded by the Ford Motor Corporation, and it promises to achieve what Stephen Benton's 'alcove hologram' never quite managed. Steve's lab meantime, is making progress with edge-lit holograms, and should be presenting the results at the SPIE conference in San José in January. Jeff Blyth and Tung Jeong are due to present a paper there too, on new development processes for Slavich materials.

For a number of years Dr Fimia's team at Alicante University has been working on silver-halide sensitised gelatin (SHSG) holograms. This process is a hybrid of silver halide and dichromate processes. If you get it right you have the speed of the former and the resolution of the latter. Nick Phillips's team has taken this up, and has been able to produce reflection holograms with near 100% diffraction efficiency. This may well be the way ahead for both HOEs and pictorial holography.

Graham Saxby

## Department of Partly-Baked Ideas

In the spring of 1990, *holosphere* was upbeat. *Publishing Technology*, the main organ for US printing houses, had displayed a hologram on its front cover. *Leonardo* was asking for papers on fine-art holography. Dimensional Foods of Boston, MA, had succeeded in printing holograms on the surface of chocolate bars. Jeff Blyth had discovered a method of sensitising dichromated gelatin to red. *Interferenzen*, the first German-language journal on holography, had just put out its first issue. At that time I was designated a Contributing Editor, and in my allotted space I wrote in detail about a method of noise reduction in Agfa masters by using a final bath in 1 % ascorbic acid under a bright light. But the DPBI had other ideas. It was looking at the direct bleaching of dyes by light energy. This was its report:

At one time the fading of dyes was a fact of life. Almost every brightly-coloured fabric was bleached if you left it in the sun for more than an hour or so. Most of the serious research on the subject was carried out by Robert Bunsen (he of the Burner, the Grease-Spot Photometer, the Ice Calorimeter and the Reciprocity Law). At that time you could actually produce a print of sorts by stapling a film positive to a piece of green curtaining and leaving it in the sun for a few days. As dyes are grainless, the DPBI has been wondering whether it might be possible to find a dye that bleaches readily to form a hologram. It would have to be sensitive to laser wavelengths, which limits things, as it is UV that does most of the bleaching. The obvious candidate is methylene blue, which has been used as a red sensitiser for dichromated gelatin. It is itself bleached by a hefty exposure to red light. The department accordingly tried a plate coated with gelatin sensitised with methylene blue and, on a suggestion by Jeff Blyth, an electron donor. After about a minute's exposure to a 15 mW HeNe laser a weakish holographic image did indeed appear. Realising that this could be an ideal way to produce live interferometric fringes without the tedium of wet processing and re-aligning the hologram in a special plateholder, the DPBI hot-glued one of its Mickey Mouse mugs to a brick and put it into a single-beam transmission set-up. After exposure, squeezing the mug across its diameter produced bands of moiré fringes skittering across the mug.

The contrast was pretty low, and the effect soon faded. Like all dyes that fade, methylene blue is a positive-working material. But what if we were to use a negative-working material, one that darkens on exposure? When the Department was young, it used to cut its initials out of paper and stick them on green apples in the sun. As the skins darkened to red, the initials stayed pale green. Nowadays we have photochromic sunglasses that darken rapidly in sunlight, and this effect could be used for real-time interferograms. The bright holographic fringes would then darken until the transmitted illumination was uniform over the hologram. If you then distorted the object the moiré fringes would leap into view in full contrast. The DPBI was looking for a sponsor to

present it with a large piece of optical quality photochromic glass sensitive to red light. Sadly, none had yet appeared.

Before I wrote this, I had proposed a somewhat similar idea, in a paper. The paper was rejected, the referee having said the idea was preposterous – which was why I went ahead and did it. It worked first time. I used it regularly after this in demonstrations to visiting engineers, who were usually much taken with the possibilities. It is a simple procedure now that we can store images at high resolution electronically, and has become a routine procedure in speckle interferometry.

Soon after the article came out, a new dye made its appearance. This was bacteriorhodopsin, a purple dye closely related to the pigment in the rod cells of the retina, with a sensitivity higher than any other dye or pigment, and close to that of silver halides. It has been used for precisely the purposes the DPBI suggested. Good old *holosphere*, you heard it first there.

Graham Saxby

# Holography Group Committee

## **Chairman**

Kevin Brown  
12 Chesson Road  
London. W14 9QX  
0207 610 1078

## **Secretary**

Bob Gibson  
12 Park Road, Chandlers Ford  
Eastleigh  
Hants. SO53 2EU  
023 8025 2171

## **Treasurer**

Jonathan Ross  
286 Earl's Court Road  
London  
SW5 9AS  
0207 370 2239

## **Newsletter Editor**

Graham Saxby  
3 Honor Avenue, Goldthorn Park  
Wolverhampton. WV4 5HF  
0190 234 1291

## **Committee Member**

George Jozsa  
81 South Knighton Road  
Leicester. LE2 3LS  
0116 270 9277

## **Committee Member**

Molly Gibson  
12 Park Road, Chandlers Ford  
Eastleigh  
Hants. SO53 2EU  
023 8025 2171

## **Webmaster**

Joyce Peck  
7 Magpie Close  
Flackwell Heath  
Bucks. HP10 9DZ  
0162 852 3076

## **Committee Member**

David Pizzanelli  
27 Kingston Road  
Leatherhead  
Surrey  
KT22 7SL  
0137 237 4254

## **Committee Member**

Jeff Blyth  
7 Bath Street  
Brighton  
Sussex  
BN1 3TB