MATERIAL WITNESS

WELL PRESERVED?

The best way of looking after cultural artefacts and heritage — manuscripts, artworks and textiles, say — is surely obvious, isn't it? Seal them in an inert atmosphere, put them into cryogenic storage in the dark, and forget about them. Of course, the question is then: what's the point? Why look after precious stuff if no one can get to see it?

This is the dilemma for museums and conservators: we'd know how best to preserve items (actually even that can be disputed, but general principles such as sterility and cold are a good place to start), if only people didn't insist on the right to look at them.

As if that's not a tricky enough equation, there are now new factors to weigh in the balance. Cryogenic cooling is seldom an option, but even conventional temperature and humidity control aren't cheap, especially with rising energy costs. And there is increasing pressure for museums and archives to account for themselves in environmental as well as financial terms: to reduce their carbon footprint.

These are the considerations that motivated Environmental Guidelines: Opportunities and Risks (EGOR), a collaboration between the UK's National Archives, Tate and the Centre for Sustainable Heritage at University College London, supported by the research councils' Science and Heritage programme. The project has just wound up and is taking stock of its conclusions.

EGOR was never seen as a purely scientific enterprise. Involvement from the arts and humanities was essential not just because the issues entail assessment of aesthetics and cultural value, but because the decisions bear on society more generally. Who decides what is worth conserving, and at what cost — are these expert judgements, or does the public (which ultimately funds museums, and provides their entire *raison d'être*) deserve a voice?

Quite apart from the present exigencies of environmental impacts, an exercise like EGOR seems to have been overdue in any event. There are a raft of standards and guidelines for conservation, both national and (in the UK) at the pan-European level. But they haven't necessarily been devised for consistency, or with modern understanding of the science and the technological capabilities in mind. Some feel that these guidelines apply unnecessary constraints on, say, humidity or lighting levels: a

PHILIP BALL

blanket application of such standards to all cases is not always warranted. There are certainly examples of damage having not occurred where present standards suggest it should have. Besides, is it preferable for ten generations to squint at revered paintings or tapestries in the gloom, or for five generations to see them in all their glory?

The EGOR team say that there is still plenty to be learnt about the behaviour of the relevant materials in different environments and on various timescales: some of the basic data are lacking. And we need to know more about the behaviour and expectations of visitors: are they prepared to accept less heating of museums, say? But we also still lack a clear framework for thinking about heritage — who values it, and why? ❐

NANOCOMPOSITES

Nanoparticles in the right place

Hybrid materials based on block copolymers and nanoparticles are a promising class of nanocomposites. Tailoring the block copolymer properties by using supramolecular chemistry allows control of the particle spatial organization and resulting composite properties.

Raffaele Mezzenga and Janne Ruokolainen

Hybrid materials based on a polymeric matrix and inorganic nanoparticles hold great promise for obtaining materials with optical, electronic or magnetic properties — generally limited to metals, oxides and ceramic materials — while preserving the easy processability of polymers. The ability to control the exact location of the nanoparticles' position within a polymeric matrix would allow the properties of the resulting hybrid material to be tailored and greatly enhanced, increasing the number of possible applications.

On page 979 of this issue Ting Xu and colleagues[1] have made an important step forward in the control of nanoparticle spatial distribution within a block copolymer matrix, by doing so without having to chemically alter the original nanoparticle surface. Importantly, this makes the approach applicable to a large range of polymer–nanoparticle systems.

Block copolymers are made up of at least two chemically different polymer segments (blocks) joined by a covalent bond. Various blocks are normally denoted by letters; for example the simplest block copolymer, a diblock copolymer, can be denoted as A–B. Block copolymers are ideal materials to use when designing specific structures that