and at specific locations in the structure. One example might be the insertion of an array of efficient micrometre-scale light emitters or detectors at precise locations in an otherwise passive optical structure. Such interventions provide additional functionality that will be attractive in other areas of semiconductor nanotechnology.

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CORRIGENDUM

In the article entitled 'A sweeter fuel' by Kevin Kendall (*Nature Materials*, **1**, 211–212; 2002), *Aspergillus niger* and *Trachyderma tsunodae* are described erroneously as bacteria. *Aspergillus* is a fungus, *Trachyderma* an insect.

MATERIAL WITNESS
E-waste not

I have a computer gathering dust in my attic. It is a little slow and the screen sometimes flickers, but otherwise there is nothing really wrong with it. Yet I'd find it hard now to give it away.

Eight years old, it is obsolete. It seems destined to become e-waste, part of the growing mountain of electronic refuse that presents one of the toughest environmental challenges for industrialized nations.

E-waste is tricky to recycle. Its materials are blended with the intimacy of a cake mix, and can't easily be unbaked. There are some unappetising ingredients: lead, cadmium, arsenic. The plastics produce nasty fumes if burned. Separating these components is not only labour-intensive but hazardous: it typically happens, if at all, in countries such as China, India or Pakistan, where heavy metals find their way into soil and water.

The costs of dealing with an electronic product at the end of its lifespan are not included in the price: a price so low that it makes a throwaway culture inevitable. It can cost more to repair these devices (assuming you can find anyone to do it) than to buy a new one. And the cell phone that slips in your breast pocket belies the many kilograms of water and other raw materials needed to make a single silicon chip.

The turnover of electronic products, especially in communications and IT, is hair-raising. In the UK alone, 15 million cell phones are replaced every year, while 90 million old models may be languishing at the bottom of drawers. A million tonnes of e-waste is produced annually; this is predicted to double by 2010. Most of it ends up buried or burned.

This may have to change. A European directive decrees that from 2004 e-waste may no longer be dumped untreated into landfills. The directive also puts in place other protective measures: banning dangerous materials, creating targets for recycling, and shifting responsibility for disposal or re-use from the consumer or governments to the manufacturer.

Cell phone producers, for example, will be obliged to recycle or dispose of old devices. With a little repair and proper testing, models considered out of date in the profligate West can be repackaged and sold at lower prices in developing markets such as Asia and Africa.

A British company called Shields Environmental is setting up such a recycling scheme, called Fonebak. Badly damaged phones are dismantled and the respective materials are put to new use: nickel (from batteries) alloyed into stainless steel, plastics recycled in granulated form, and so on. Fonebak anticipates processing three million phones this year, cutting out 1,500 tonnes of waste.

But tackling e-waste in the long term may force us to confront the reasons it exists. The lifespan of consumer products, once determined by the time taken for irreparable breakdown, is now controlled by fashion and the rapidity of technological change. The only brake may be to set prices according not to production costs, which may be nominal, but to total lifecycle costs.

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