

JAF02 Unit 10 Nanotechnology

Task 1 Brush up on your nanotechnology

Look at the article about nanotechnology. It is in three parts with different tasks for each section. In the first section think of a suitable word to fill in each gap.

1. Brush up on your nanotechnology

The world's smallest brushes with bristles more than a thousand times thinner than a human hair, have been _____ (1) by researchers in the USA. The brushes can be used for sweeping, painting minute structures and even cleaning up _____ (2) in water. The bristle's secret is the carbon nanotube, that is a tiny straw-like molecule just 30 billionths of a metre _____ (3). These are incredibly tough and yet _____ (4) enough that they will yield when pushed from the side. The scientists grow bristles from hot, carbon-laden gas on to a material _____ (5) than baby's hair, namely, carbon silicide.

2. Choose the best verb to fill each gap, using a participle (-ed or -ing) form as appropriate.

be coat dip include know lead pick publish

The researchers, _____ (1) by scientist Pullickel Ajayan from Rensselaer Polytechnic Institute in Troy, New York, reported their work in the journal *Nature Materials*, _____ (2) yesterday.

The team, _____ (3) internationally for showing how carbon nanotubes can be grown controllably, has now used the trick to make nanobrushes shaped like toothbrushes, bottle brushes and cotton-buds. Like normal brushes, the nano varieties have many uses, _____ (4) sweeping up piles of nano-dust. And brushes _____ (5) into a solution of iron oxide can be used to paint tiny structures – the minute brush hairs _____ (6) up the oxide particles which can then be wiped onto a bare surface.

In another of their demonstrations, the researchers show that with the bristles _____ (7) in absorbent materials, the brushes will soak up poisonous atoms from contaminated water. And the carbon brushes could end up with larger-scale uses, too. Carbon nanotubes, _____ (8) able to conduct electricity, could be used in electric motors.

3. There is one extra word in some of the lines. Find it and cross it out.

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However, the scientists, with concerns already have being expressed about nanotechnology and its effect on the environment, will have to make it sure their brushes do not lose bristles in the environment, and have already started to testing how easily they can be pulled off.

From prehistory to nanotechnology

It seems to likely that brushes, or at least their simple ancient equivalents, were among the first inventions of our ancestors. The oldest surviving example, is believed to be the property of some ancient hunter or cave artist, dates from 30,000 years ago.

It seems fitting that miniature versions of these ones should be a feature of the growing field of nanotechnology.

(adapted from Haines, S.; Nettle, M. *Advanced Grammar in Use. Suppl. Ex.* CUP, 2007)

Task 2 Conjunctions

Complete these sentences with your own ideas.

1. Nanotechnology is science and engineering at the scale of atoms and molecules, whereas...
2. Supposing nanotechnology advances rapidly, ...
3. Nanomaterials have profoundly different physical and chemical properties due to...
4. Engineering at the nanoscale is no simple feat, unless...
5. We love nanotechnology although...
6. I'd like to get a job in nanotechnology, however, ...