BREVET DE TECHNICIEN SUPERIEUR
ELECTROTECHNIQUE

ANGLAIS

Durée : 2 heures

Coefficient : 1

Dictionnaire bilingue autorisé
Tout autre matériel est interdit

PLIABLE SOLAR CELLS ARE ON A ROLL

IMAGINE wearing a jacket or rucksack that charges up your mobile phone while you take a walk. Or a tent whose flysheet charges batteries all day so campers can have light all night. Or a roll-out plastic sheet you can place on a car's rear window shelf to power a child's DVD player.

Such applications could soon become a reality thanks to a light, flexible solar panel that's a little thicker than photographic film and can easily be applied to everyday fabrics. The thin, bendy solar panels, which could be on the market within three years, are the fruit of a three-nation European Union research project called H-Alpha Solar (H-AS).

The new solar panels will be cheap, too, because they can be mass-produced in rolls that can be cut as required and wrapped around clothes, fabrics, furniture or even rooftops. "This technology will be a lot easier to handle than the old glass solar panel," claims Gerrit Kroesen, the physicist from Eindhoven University of Technology in the Netherlands who led the development team.

Kroesen's team has made its solar cells bendy simply by making them thin. But this has involved a trade-off. While the best solar cells are now working at efficiencies above 20 per cent, the H-AS cells are only about 7 per cent efficient. The researchers think efficiency is worth sacrificing for a cell that is going to be more generally useful, though they still hope eventually to reach 10 per cent efficiency.

Conventional solar panels are made of pairs of sheets of semiconducting silicon, doped with phosphorus and boron* atoms. Electrons in the phosphorus-doped (N-type) layer migrate across the boundary to occupy holes left in the boron-doped (P-type) material, setting up a voltage across the boundary between the two layers. When photons hit the silicon in a cell they knock electrons out of its crystal structure, generating a current that is collected by a mesh of metal contacts.

The H-AS solar panels are constructed in a similar way, but they are made just 1 micrometre thick by depositing polymorphous silicon at high pressures and temperatures. "Polymorphous silicon is as rigid as crystalline silicon. But because it is less than a micrometre thick it is flexible", Kroesen says.

The process of producing H-AS films involves temperatures of up to 200 °C, which would melt a plastic substrate. So instead of depositing the doped layers directly onto plastic they are first deposited onto aluminium foil. After the assembly has cooled, a plastic carrier layer is added underneath it and the aluminium is removed and recycled. Contacts are then added, followed by a protective plastic layer on top, too.

* *boron* = bore

485 mots
(adapted)
NewScientist.com
18 December 2004
Fred Pearce Uppsala

TRAVAIL A FAIRE

I - COMPTE-RENDU (*12 points*)

Vous **rédigerez en français** (200 mots ± 20 %) **un compte-rendu** clair, pertinent et utilisable du document proposé. Vous veillerez à restituer tous les éléments importants dans un français de qualité et indiquerez le nombre de mots utilisés.

II - TRADUCTION (*8 points*)

Vous **traduirez en français** le passage encadré de : " IMAGINE wearing a jacket..." jusqu' à "...research project called H-Alpha Solar (H-AS) ".