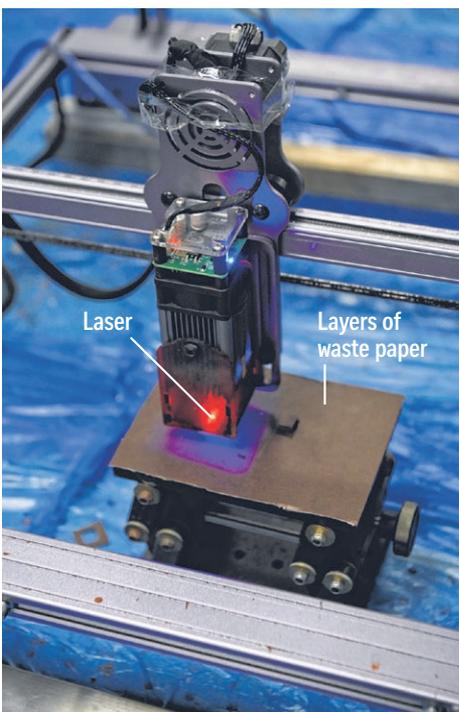


# Adding value through upcycling

Nanyang Technological University (NTU) has come up with a new way to extract carbon for batteries and foam blocks, relying on waste paper instead of fossil fuels. **The Straits Times** takes a look at how carbonised paper is made and its potential uses.

## MAKING CARBON FROM WASTE PAPER

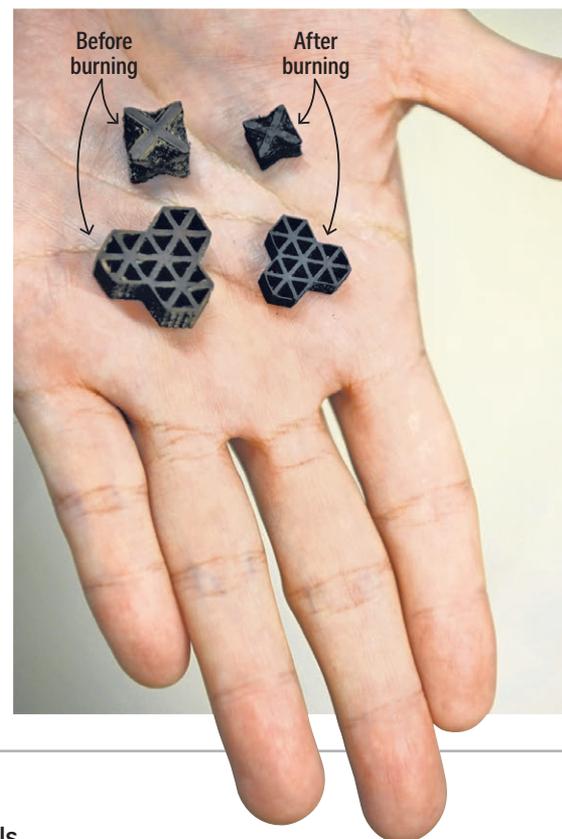
**1** Waste paper is stacked and cut with a laser to form bricks that can be used to build carbon foam blocks or battery anodes.



**2** The blocks are placed in a furnace for about 24 hours at up to 1,200 deg C. Oxygen is sucked out of the furnace to ensure the paper produces carbon.



**3** The result: blocks of carbon made out of burnt paper. NTU scientists say these blocks are stronger, more flexible and better at storing electricity than carbon made of fossil fuels.

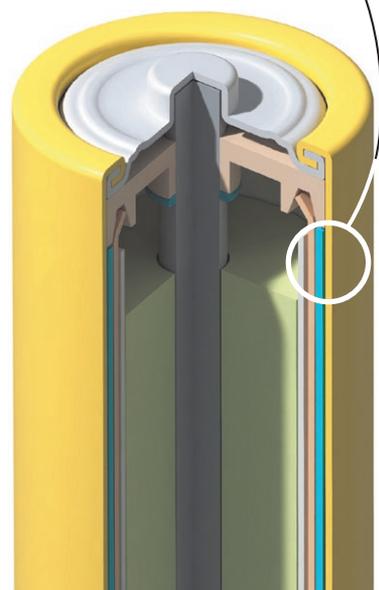
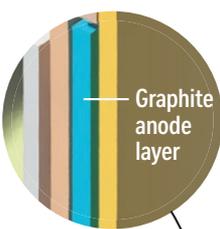


## HOW PAPER CARBONISATION CAN BE USED

Carbonised paper offers a new way to extract carbon, which is typically forged from fossil fuels

### Cleaner battery cells

Carbonised paper replaces the graphite anode layer in a battery cell and releases electrons to generate electricity when a device is used.



### Carbon foam blocks

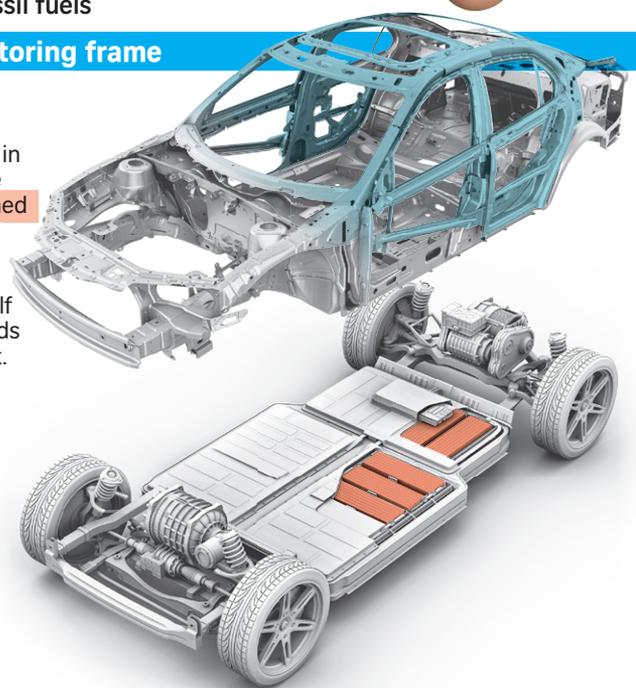
Instead of fossil fuels, carbonised paper offers a cleaner alternative resource for building carbon foam blocks, which are often used for fire protection walls, crash absorption panels and sound absorption panels in studios.



### Electricity-storing frame

**NOW**  
Anodes that store electricity in battery cells are typically contained in a hub at the base of electric vehicles (EVs). But the hub itself is heavy and adds to a car's weight.

**FUTURE**  
Manufacturers can line an EV's frame with carbonised paper anodes, building the battery as part of the frame, reducing the vehicle's weight.



## HOW MUCH CARBONISED PAPER IS NEEDED IN EVERYDAY ELECTRONICS

	Battery capacity	Weight of carbonised paper required
Portable speaker	3,600mAh*	36g
Smartphone	4,000mAh	40g
Electric vehicle	50kWh	100kg–200kg

NOTE: \*mAh = milliampere hour

Source: NTU TEXT: OSMOND CHIA PHOTOS: MARK CHEONG, FOSTERING ARTS AND DESIGN, ISTOCK STRAITS TIMES GRAPHICS