**The Straits Times, 16 June 2006, pH17**

# Building a better gas mask with unique nanofibres

## PVC-based fibres can break down toxic nerve gases

By Tania Tan

GAS masks and full-body suits that protect soldiers against chemical warfare agents like nerve gas are heavy, often weighing several kilograms.

Mr Wang Zhenglin, 22, who was in the chemical defence unit of the Singapore Armed Forces, said the gear was "stuffy" and the gas masks "made it difficult to breathe".

But researchers at the National University of Singapore may be able to lighten that burden now that they have come up with a unique nanofibre material.

Professor Seeram Ramakrishnan and his team of 30 have created a cloth-like material that can not only trap nerve agents, but also decompose them into non-toxic substances.

Made from polyvinyl chloride or PVC, the microscopic fibres are made by passing liquid PVC through a high-voltage power supply, explained the dean of the Faculty of Engineering.

The electric charge causes the gel-like PVC to stretch into a very fine thread which is collected on a special plate and further manipulated by computerised processes into membranes or thicker threads.

Traditional gas masks use filters and activated carbon which can only trap inhaled chemical agents but not break them down.

Activated carbon is considered "biohazardous material" and is difficult to dispose of because the toxins remain on the filters, explained Prof Ramakrishnan.

But his team has developed catalysts which break down nerve gas. These catalysts are incorporated into the fibres.

Tests have been promising resulting in an end-product that is able to break down analogs of nerve gas agents — which are chemicals that are structurally similar but less toxic — in "two to eight minutes". Because activated carbon cannot decompose toxins, these normally take years to break down.

The two-year project to build more comfortable gas masks was commissioned by the Defence Science and Technology Agency.

Started last year, the team's findings have already drawn the attention of the international community.

Researchers from the US Homeland Security agency have expressed interest in the findings.

The next step in the $200,000 project will involve fine-tuning the catalysts used on the fibres.

"There are a lot of chemical warfare agents out there," said Prof Ramakrishnan. "We hope to find something that can counter all of them."

If successful, this new technology could mean good news for soldiers everywhere.

"Training won't be so uncomfortable," said Mr Wang.

taniat@sph.com.sg

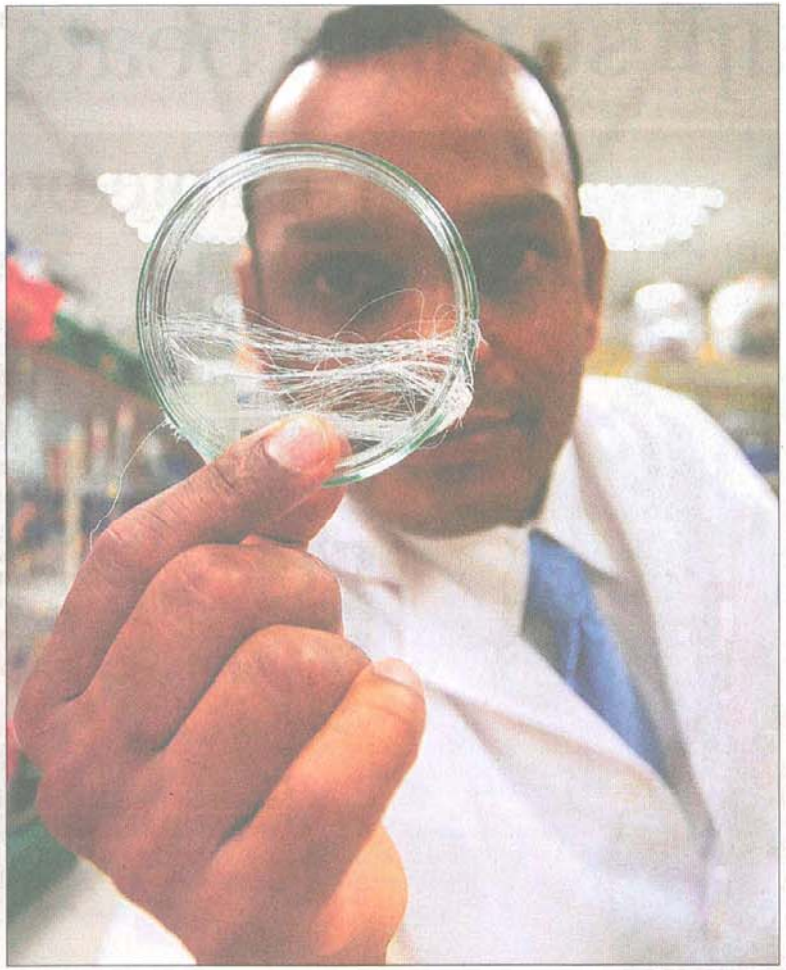

PHOTO: CAROLINE CHIA

**FINE FIBRES:** Professor Seeram Ramakrishnan holds threads of the cloth-like material that can not only trap nerve agents, but also decompose them into non-toxic substances.