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IISc scientists produce generator that runs on gas

BY PALLAVA BAGLA

New Delhi, Aug 16: In a global first, two Indian scientists have devised a tiny electrical current by merely passing a lot of gas over semi-conductors.

This innovation by Ajay K. Sood and his student Shankar Ghosh at the Indian Institute of Science, Bangalore, is already drawing laurels from across the world for its simple design and immense technological potential. Some observers are even of the opinion that this is the greatest Indian scientific discovery in the last 50 years.

"Gas flow energy can be converted directly into the electrical signal – thus having a potential for applications in generating electricity," the duo asserted.

Already being dubbed "Sood effect", the two scientists work at the world famous department founded by Nobel laureate Sir C.V.Raman, the discove-

rer of the 'Raman Effect'. The two may have to wait for the recognition they deserve, however, they have already broken a new ground with their experiment which has many parallels with Raman's historical experiments. One of them is that it cost them a few thousand rupees, reinforcing the fact that good science can sometimes be independent of large grants.

Ghosh says it took them not more than a month to complete the experiment. A media-shy and soft-spoken Sood calls it an 'idea-driven finding'. In this week's American publication – *Physical Review Letters* – they have succinctly demonstrated that an electric current and a voltage difference can be generated merely by gently flowing over a doped semi-conductor a common gas like oxygen, argon or nitrogen.

The scientists passed ordinary pure compressed gas at velocities ranging



Shankar Ghosh and Ajay K. Sood

from a few kilometers per hour to speeds of thundering cyclones over inclined 3 mm surfaces.

Each time they got a measurable ele-

trical signal of the order of micro-amperes. Sood explains that these measurable signals come about because of two commonplace physical principles called the "Bernoulli's Principle" and the "Seebeck Effect". The gas, when it strikes the small inclined surface, because of the "Bernoulli's Principle", produces a pressure gradient at the frontal and rear parts (the same effect that helps airplanes fly). This tiny pressure gradient in turn produces a temperature differential on the surface, which leads to production of a tiny electrical current – called "Seebeck Effect".

The work is still at the proof concept stage but application possibilities are many from developing tiny measuring devices to cascading millions of such chips to make nano dynamos or generators.

Incidentally the current can also be generated using air so the possibility

of converting wind energy to an electrical current without the use of windmills and turbines is also plausible.

So unparalleled is the finding that the duo had a tough time citing any contemporary work as a reference in their path-breaking paper. The scientists have already sought a patent protection in over 120 countries through the Patent Co-operation Treaty.

This experiment immediately opens up immense technological possibilities where, in future, electrical generators need not have any moving parts at all, unlike the roaring monstrosities of the present to developing nano-scale measuring devices to monitor fluid velocities in wind tunnels.

Describing it as an "outstanding breakthrough", Valangiman Subraanian Ramamurthy, secretary of the Department of Science Technology, New Delhi, says "the finding has wide-ranging technological possibilities".