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Carbon capture that could help the world
Newcastle Herald, Newcastle

Carbon capture that could help the world

BY **DAMON CRONSHAW**

A $1.5 million pilot production plant will be established at the University of Newcastle to develop nanomaterials that capture carbon dioxide, giving fresh hope to humanity's need to tackle climate change.

Professor Ajayan Vinu said the aim was to adsorb carbon emissions from coal-fired power plants and the environment and convert it to clean fuel.

The technology, which uses an abundant type of Australian clay to adsorb carbon dioxide, can also be used to clean up pesticides, pharmaceutical chemicals, heavy metals, textile dyes and PFAS [like the pollutants at Williamtown].

As such, the technology will also be aimed towards the wastewater sector.

Professor Vinu, director of the university's Global Innovative Centre for Advanced Nanomaterials, said the technology could have "a huge impact".

"Our materials can develop clean-energy technologies. This has the potential to capture the CO2 [carbon dioxide] and convert it into a high-value product that makes a significant breakthrough, helps the environment and mitigates global warming," Professor Vinu said.

"The unique thing about our centre is we not only capture the CO2, but convert it into clean fuel - methanol or other fine chemicals. It can generate clean energy."

The pilot plant is planned to run for three years, with a full production plant planned near the Port of Newcastle within two years.

The plan involves selling the technology to coal-fired power plants around Australia and "working with them on setting up carbon capture facilities".

"Once this technology is developed we will set up the plant near the port, so we can easily ship those materials all over the world."

The professor's team and the industry partners (Andromeda Metals, Minotaur Exploration and their joint research and development company Natural Nanotech) are discussing investment opportunities with venture capitalists. These companies are funding the pilot plant.

"This has not happened overnight. We have been collaborating with industry for four years. Now it reaches a point where we can translate our technology into a commercial product."

He said the technology "adsorbed a huge quantity of carbon dioxide".

"This will be the next generation adsorbent system for carbon capture."

He said the pilot plant would be "definitely set up at the University of Newcastle".

"Vice Chancellor Alex Zelinsky is very keen to set up this kind of plant within the campus, so it will benefit the local community and create job opportunities for locals.

"Our centre is also having the mission of supporting the community and the world. The material we're producing at present is the best in the world.

"This attracted the Indian Defence Ministry to work with us on capture of CO2. They've seen our papers we've published and some of the material that showed amazing CO2 adsorption."

The Indian Defence Ministry has awarded the professor's team a $1.6 million research grant.

The university's Deputy Vice-Chancellor for research and innovation, Professor Janet Nelson, said Professor Vinu's work on "innovative solutions for air and water purification aligned with the university's commitment to partner with industry to help solve local, national and global problems".

"With the dual benefits of boosting the Australian economy and cleaning up

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the environment, I am looking forward to seeing the impact this project will have in our region and on a broader national scale," Professor Nelson said.

Professor Vinu's team is using Australian halloysite nanotubes, which contain "tiny tubular structures with unique porous structure".

"We have more than 60 megatonnes of the halloysite available in Australia in one place - Camel Lake in South Australia. This clay has a nanotubular structure that's naturally available.

"That's the beauty of that material. And it has a unique dimension at the nanoscale [a nanometre is one-billionth of a metre]."

Professor Vinu's team can transform "low-cost, naturally available nanostructural clay material into high-value nanotubular carbon or other nanohybrids".

A nanoclay mould is made and coated with nanocarbons or "nanoporous carbon nitride", which the professor discovered in his lab. This is combined with the halloysite nanotubes to create "novel advanced nanomaterials or hybrid materials that adsorb pollutants".

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IMPACT: Professor Ajayan Vinu is using nanotechnology to capture carbon, which could help tackle global warming. **Picture: Simone De Peak**