



ENI AWARD 2023

Advanced Environmental Solutions

Thalappil Pradeep

Winner

Affordable clean water using advanced materials

Research Description

Thalappil Pradeep discovered advanced materials and associated phenomena to remove toxic contaminants from water, implemented affordable and sustainable drinking water solutions benefitting millions of people and established an innovation ecosystem around clean water for global benefit.

He is a pioneer in nanotechnology for water purification and its implementation. During early 2000s, he showed that nanoscale materials can degrade pesticides in water to amorphous carbon. This was translated to a product in 2007, which has reached over 12 million people. Later, he developed sustainable and affordable nanoscale materials for the removal of harmful contaminants such as iron, arsenic, uranium and other heavy metals from water. These materials are 'water positive' and the technology, implemented as home and community units, is delivering clean water to 1.3 million people each day. In the course of this work, he contributed to nurturing an innovation ecosystem around water in academic institutions. He founded the International Centre for Clean Water, a new centre open to all to build new water technologies to contribute to global water security.

The arsenic and iron removal technology he developed, named AMRIT (Anion and Metal Removal by Indian Technology), is delivering about 70 million litres of arsenic- and iron-free water every day at a cost of 2.1 paise (US\$0.00028) per litre, conforming to all water quality standards. Arsenic poisoning, the largest mass poisoning in the history of humanity, has an affordable and sustainable solution now, and therefore, India has approved it for national implementation. It is estimated to have a market size of \$600 million per year, from Indian business alone. AMRIT is expected to reach ~100 million people globally in ten years as the solution can be deployed anywhere. He has demonstrated that scientific solutions for large problems of the nation can be found locally with advanced materials, and they can be translated on ground with simultaneous wealth creation. As a result, he has created an example for everyone to follow.

Water quality is declining across the world and more regions are exposed to arsenic, uranium, and other heavy metals and chemical toxins. Studies on the individual and collective effects of toxins are making their safe limits in water to be brought down. Therefore, improved technologies for providing affordable clean water are being explored across the world. While there are several materials-based solutions for clean water, there are no technologies working at this cost and effectiveness which make AMRIT deployable across the world. Easy maintenance and safe disposal of the spent media have helped governments and communities adopt the technology.

Most of the water quality issues on the planet exist in India. While there are many solutions, the key aspects that can transform the society are their affordability and sustainability on the ground so that clean water is delivered to all, especially the poor. Solutions in India are solutions for the world. To enable this, an innovation ecosystem on water open to all is essential and he has established one.

His other discoveries in the areas of molecular and nanoscale materials and associated phenomena have implications to clean environment and ultrasensitive devices.