

Nano-Composite Arsenic Sorbent

New Environmental Protection Agency (EPA) standards have reduced the maximum concentration of arsenic in drinking water from 50 parts per billion (ppb) to 10 ppb, creating an expensive dilemma for 4,000 American municipalities and nearly 14 million homeowners. Now, INL nanotechnology researchers have engineered a revolutionary and affordable material called Nano-Composite Arsenic Sorbent, or N-CAS, that is up to seven times more effective than the best material currently avail-

able. This technology will aid millions of Americans, but also more than 70 million people around the globe, who are exposed to dangerous arsenic concentrations in their drinking water.

N-CAS contains high concentrations of arsenic adsorbing nano-particle metal oxides embedded in a strong composite polymer matrix. It excels in offering significant reaction kinetics, exceptional strength and an extreme surface area. In fact, one gram of N-CAS contains 40% more adsorbent surface area than the square footage of the

average American home. It is estimated that one gallon of N-CAS can treat 350-400,000 gallons of water compared to 50,000 for the next best material today.

It is also estimated that N-CAS is more affordable; costing approximately ten cents per thousand gallons of water treated, about 1/5th of other methods. N-CAS also is compatible with packed-bed treatment systems and durable enough to withstand repeated

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recharging without appreciable loss of capacity (reducing operational costs). N-CAS is:

- Composite material made of approximately 15% polymer by mass with remainder made up of Fe(III) hydrous oxide compounds (85% by mass)

N-CAS has:

- Surface area – 275-350 m₂/g (Comparable with carbon nanotube materials)

Compared to other arsenic removal treatments, N-CAS offers a nano-composite material characterized by –

- An extremely expanded surface area producing a high adsorbing capacity and exceptional arsenic bonding ability.
- High efficiency in removing arsenic rapidly, using high-flow systems and even in water with relatively low arsenic concentrations.
- Unparalleled strength that permits successive regeneration and an exceptional long life-cycle, which reduces operating costs by a factor of 4 or 5.
- Passes EPA's Toxic Characteristic Leaching Procedure (TCLP) to determine the toxicity of waste, which means the spent N-CAS is environmentally friendly

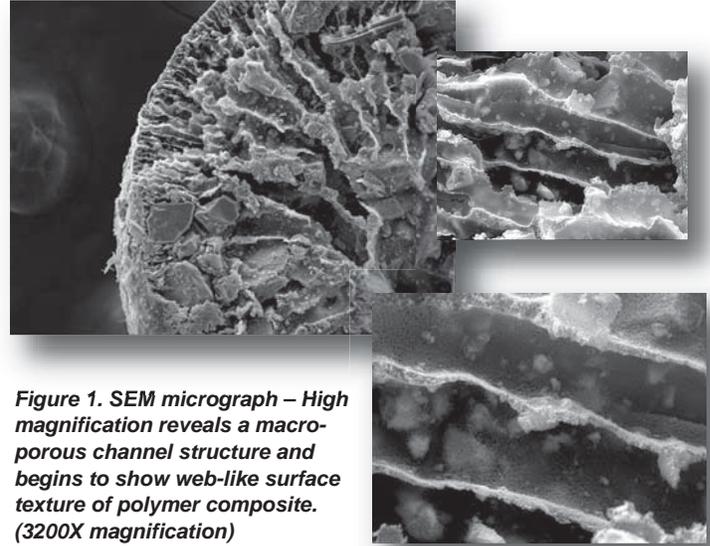


Figure 1. SEM micrograph – High magnification reveals a macro-porous channel structure and begins to show web-like surface texture of polymer composite. (3200X magnification)

and easily disposed. Arsenic contamination is a global problem causing various types of cancer, neurological disorders and needless suffering throughout the world. Tens of thousands of communities and tens of millions of people need a low-cost, highly effective arsenic removal technology.

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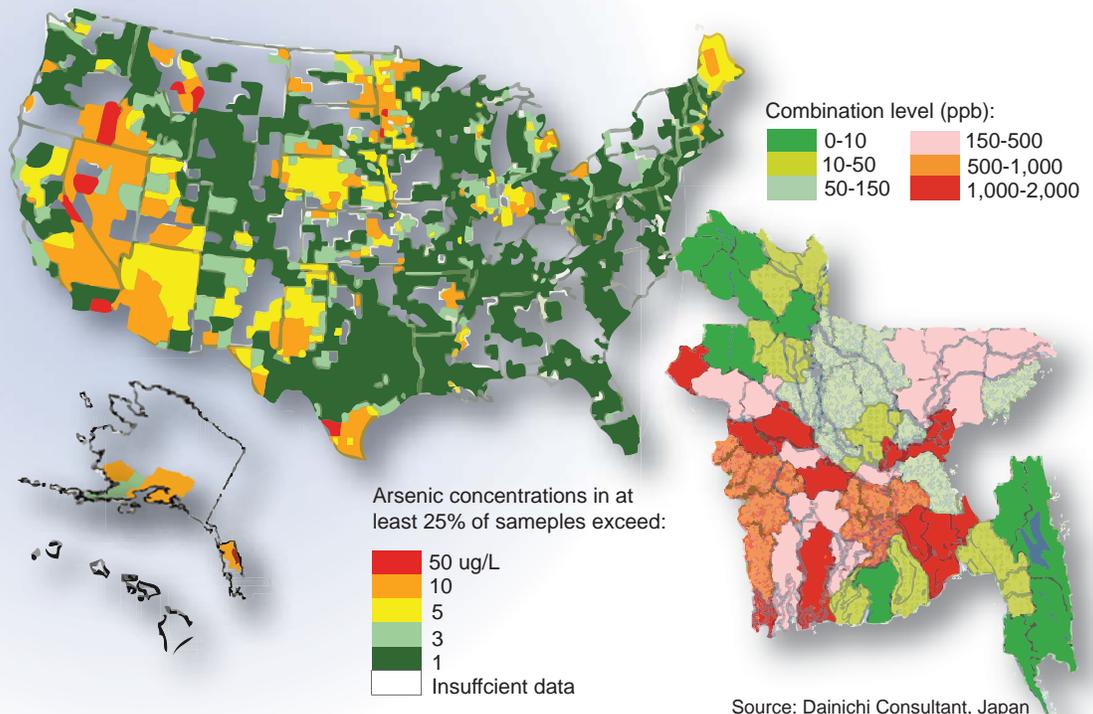


Figure 2. Arsenic concentrations in Bangladesh and the United States.