



THE CHALLENGE

Treating contaminated soils — especially those affected by heavy metals, hydrocarbons, or saline conditions — has long relied on aggressive chemicals that harm ecosystems and degrade soil health.

NICO Nanobubbles provide a breakthrough solution: a cleaner, safer, and more efficient technology that restores soil health without compromising the environment.

THE NICO NANOBUBBLE ADVANTAGE

NICO's ultra-fine gas nanobubbles possess unique physicochemical properties that make them ideal for soil remediation. By infusing gases like oxygen or carbon dioxide at the nanoscale, we enhance oxidation, nutrient balance, and microbial activity—resulting in deeper, faster, and more sustainable cleanup.



Soil Conditioning in Saline-Alkaline Environments: Micro-nanobubbles improve soil structure and microbial activity, reducing plant stress and enhancing crop productivity without harmful chemicals.

Nutrient and Organic Matter Mobilization: Gas nanobubbles (CO_2 , O_2 , N_2) enhance the release of essential nutrients like Ca^{2+} and PO_4^{3-} , improving soil fertility and microbial balance while reducing toxic compounds such as fluoride.

Oxidative Degradation of Organic Contaminants: Reactive oxygen species (ROS) generated by nanobubbles break down hydrocarbons and persistent organic pollutants. Catalytic nanobubble water achieved up to 74% diesel hydrocarbon removal from contaminated soils.



KEY APPLICATIONS

Heavy Metal Removal by Enhanced Leaching: Oxygen nanobubbles boost oxidation potential and solubilization, enabling effective desorption of metals such as Cadmium (Cd), Lead (Pb), and Chromium (Cr) for safer extraction and disposal.

Enhanced Phytoremediation: Nanobubbles increase root oxygenation and modify rhizosphere chemistry, improving plant growth and metal uptake. Studies show 20% higher biomass and 17% greater cadmium absorption under stress conditions.

SUSTAINABLE DEVELOPMENT GOALS



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SUSTAINABLE BENEFITS

Enhanced Heavy Metal Removal

Increases desorption and mobility of toxic metals for more efficient cleanup.

Improved Plant Growth & Soil Microbiology

Boosts root health, microbial balance, and overall soil vitality.

Chemical-Free & Eco-Friendly

Minimizes the use of harmful chemicals while protecting the environment.

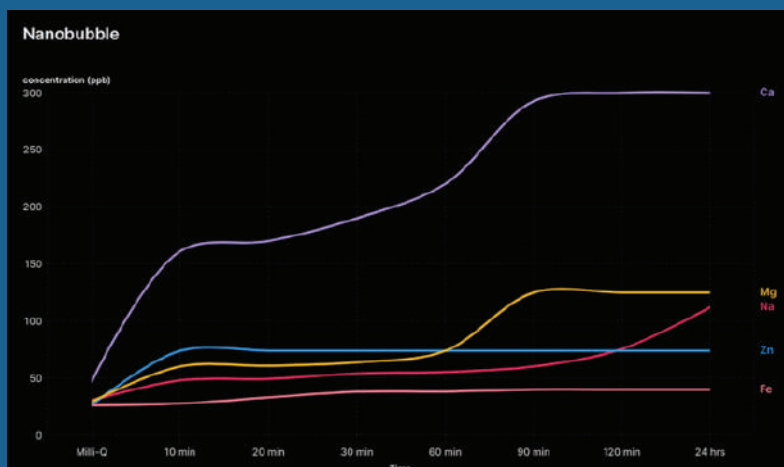
Reduced Costs & Higher Efficiency

Accelerates remediation while lowering energy and treatment costs.



A STEP TOWARD SUSTAINABLE LAND RESTORATION

NICO Nanobubbles represent a significant advancement in soil decontamination, helping restore polluted lands, reduce environmental harm, and promote long-term agricultural resilience.



NICO NANOBUBBLE GENERATOR SYSTEMS



Mobile: +91 92119 93387 | E-mail: info@niconanobubbles.com | Website: www.niconanobubbles.com