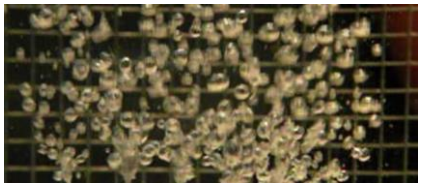
UWM RESEARCH FOUNDATION Technology Overview

# Sharp Nub Diffuser Membrane Improves Water and Wastewater Aeration

**OTT ID# 1227**

## TECHNOLOGY

The technology is a rubber membrane air diffuser for aerating water and wastewater. The membrane uses a sharp nub perforation in the rubber membrane to generate bubbles with smaller diameters and larger surface area compared to bubbles from conventional rubber membrane diffusers. Performance data indicates a 400% reduction in bubble diameter compared to bubbles from conventional systems.



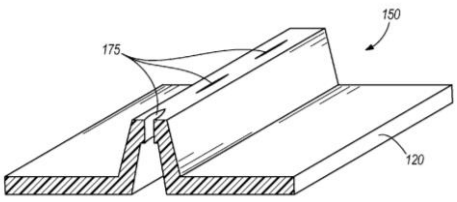
Aeration in wastewater treatment increases the amount of oxygen available to microorganisms, increasing their productivity in braking down organic matter and in turn increasing the rate at which wastewater is processed. Current products for aerating waste water include subsurface aeration and mechanical aeration. Subsurface aeration employs various systems but largely utilizes a rubber membrane disc that is perforated and secured to a system that pushes air through the membrane into the water. The improved nub design from computational fluid dynamic models and testing indicate a potential for improvements in the Saturated Oxygen Transfer Efficiency. Current tests compare SOTE of commercially available membranes which have over 1,000 perforations per membrane and improved nub prototypes with about 500 perforations per membrane. UWM researchers are looking for a partnership for membrane development with comparable perforations per membrane and small pilot scale testing capabilities.

## FEATURES/BENEFITS

- Easy to upgrade existing diffuser systems
- Interchangable with existing fine bubble rubber membranes
- Increases the oxygen transfer efficiency

## INTELLECTUAL PROPERTY

US Patent 8,888,074 - A membrane for use in an air diffuser. The membrane includes a nub with a perforation. The nub and perforation and arranged and sized to create smaller bubbles of gas in a liquid column above the membrane.




**This technology is available for licensing on a non-exclusive basis.**

## MARKETS

The rubber membrane aeration technology was initially designed for use in wastewater treatment plants, but the membrane can be applied to and is easily scaled for aeration of ponds, lakes, aquariums, fish tanks, and for ascetic bubble curtains. Diffuser membranes mke up a portion of the global wastewater aeration market which was recently estimated at $7.3 billion.

Technology Overview

## PUBLICATIONS

Alkhalidi, A. A. T. and Amano, R. S. (2015), Factors affecting fine bubble creation and bubble size for activated sludge. Water and Environment Journal, 29: 105–113.

## INVENTOR

Ryoichi Amano, Ph.D.

Dr. Ryoichi Amano is a professor in the Department of Mechanical Engineering at the Univeristy of Wisconsin – Milwaukee. Dr. Amano's research interests are in the area of computational fluid dynamics, turbomachinery, heat/mass transfer, metal matrix composites, environmental remedial technology, micro-biological transport phenomena, aerodynamics, and propulsion engineering.

**For further information please contact:**
**Jessica Silvaggi, Ph.D.**
*Director of Technology Commercialization*
UWM Research Foundation
1440 East North Avenue
Milwaukee, WI 53202
Tel: 414-906-4654