



SBIR - Environmental Products Phosphorus Removal & Recovery

US EPA

**Water Technology Innovation
Cluster Leaders Meeting**

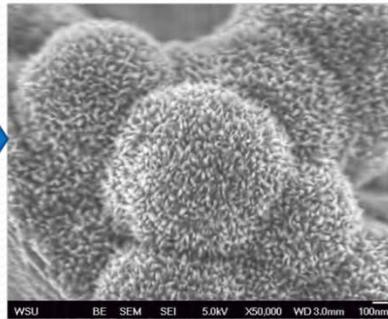
Dr. Richard Schorr, CEO
jrschorr@metamateria.com

PO4 Capture & Recovery Product

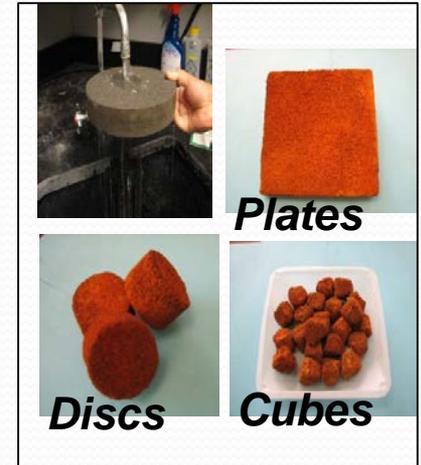
Porous Media



Nano-Enhanced



**Nano-FeOOH
Crystals
in Porous
Ceramic *Shape***



Value Added

- ✓ **Holds much more P/Kg** than other sorbents
- ✓ **Works at high and low concentrations** (0.07 – 100 mg/L)
- ✓ **Can reuse multiple times** (15-20)
- ✓ **Long Life & Cost Effective** for most applications
- ✓ **Phosphorus can be recovered**

Working with Others

- MetaMateria began in Technology Incubator
 - Companies Interacted & Shared Experiences
 - *Resources, Knowledge and Equipment*
 - *Business guidance available*
 - *Help each other with Proposal Preparation*
 - Clusters can have impact when Application Focused
 - Companies need to understand Needs and Hurdles
 - *Limited resources requires fewer blind alleys*
- Understand moving technology from
Idea → Product → Demo → Mkt Entry

Differences Exist in SBIR Agencies

- **DOD/DOE**
 - Clearly defines problem to be solved
 - Often explains what constitutes a successful solution
 - SBIR often tied to existing program needs
- **NSF**
 - Looks for new technology with commercial potential
 - Need to define the problem and how \$ will lead to solution
- **EPA**
 - Broad range of areas – interested in useful technology that can be commercialized in near term (few years)
- **USDA**
 - Tied mostly to issues of the farming community

MetaMateria SBIR Awards

- NSF (Phase I & II) 2011-2015
Develop improved nano-enabled Phosphorus removal media
- USDA (Phase I) 2014-2015
Demonstrate removal of antibiotics/pharmaceuticals & nutrients (Phosphorus & nitrate) from water leaving farms
- USDA (Phase I) 2015-2016
Pathogen filtration for greenhouse irrigation with nano-iron media
- EPA (Phase I) 2014
Phosphorus Removal and Recovery from Municipal Wastewater
- Ohio Dept. of Developm't Third Frontier (\$1 M award) 2010-14
Water Purification Products - Needed 1:1 \$ Match

SBIR Benefits for MetaMateria

- Developed new capabilities to make nano-enabled materials with enhanced properties for water clean-up
- Developed superior product for phosphorus removal and recovery & scalable processes for manufacturing
- Demonstrated usefulness of product for capture at high P (> 100 mg/L) and low P (< 0.1 mg/L)
- Attracted environmental engineering firms and companies interested in recovering phosphorus
- Attracted investors for capital to scale up manufacturing
- Sales growing and expect this to accelerate in 2016

Summary

- SBIR program can be key to company growth
 - Forum to establish creditability
 - Develop process knowhow
 - Springboard for market acceptance & expansion
- Demonstration of products in field tests
- Attracts considerable interest by others
- Helped to establish strategic partnerships for rapid market expansion

