NIST Metrology for Carbon Dioxide Removal and Carbon Sequestration in Building Materials

Authors: Pam Chu, Craig Brown, Aron Newman, Ed Garboczi, Dan Neuman, Andrew Allen, Chris Stafford, Vince Shen

Email: dac.ccus@nist.gov

Abstract: NIST is leveraging unique capabilities and expertise in sorption science and materials characterization to develop the critical measurements and metrologies needed for scalable carbon dioxide removal (CDR) and carbon sequestration in building materials. To maximize impact, NIST is building collaborations with other government agencies, industry, and academia. Results will be delivered through reference measurements and data, standard and reference materials, and validated computational simulations. NIST's capabilities, approach, and near-term efforts are presented. NIST is also working to identify additional areas to further support the global effort to reach net-zero.

Material Characterization for Carbon Dioxide Removal

NIST Team: A Baumann, M Carter, H Evans, H Hatch, J Hoffman, D LaVan, J Manion, W McGivern, G Nguyen, D Siderius, F Yi, R van Zee



Carbon Sequestration in Building Materials

NIST Team: R Cook, H King, B Lang, R Murphy, B Scruggs, C Suiter, P Stutzman, J Widegren, M Winchester

Program Goals:	Carbon and Carbonate Analysis	Vapor Phase NMR Adsorption kinetics	Neutron imaging & USAXS/SAXS & XRD of OPCs and PLCs
	Combustion		 Ordinary Portland Cement (OPC) and OPC-Limestone (PLC)

Help enable the innovation and adoption of low-carbon building materials

- Engage stakeholders through an industry consortium
- Develop, evaluate, and standardize methodologies to quantify CO₂ uptake in cements/concretes
- Lead ASTM Standard Test Method development
- Draft guide for material-specific issues to enable ensure measurement comparability across materials.
- Facilitate interlaboratory measurement comparisons
- Measure kinetics and adsorptive capacities
- Distinguish between chemical and physical adsorption



Collaboration with Virginia Tecl



 National Institute of

 Standards and Technology

 U.S. Department of Commerce

Materials Measurement Laboratory NIST Center for Neutron Research Engineering Laboratory