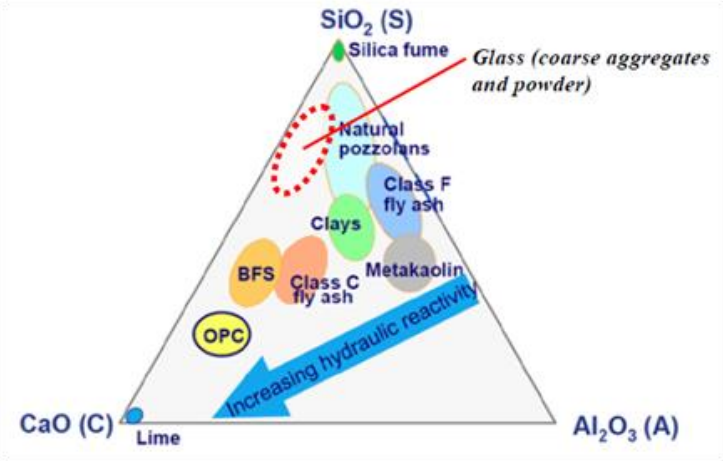
UTC Project Information	
Project Title	Environmentally Friendly Pervious Concrete for Treating Deicer-Laden Stormwater
University	Montana State University
Principal Investigator	Xianming Shi & Laura Fay
PI Contact Information	406-994-6486; Xianming_s@coe.montana.edu; Xianming.Shi@gmail.com 406-994-1697; Laura Fay; laura.fay@coe.montana.edu
Funding Source(s) and Amounts Provided (by each agency or organization)	CESTiCC, WSU & Clear Roads
Total Project Cost	$91,558
Agency ID or Contract Number	101408
Start and End Dates	October 2014 – September 2014
Brief Description of Research Project	Stormwater control is a national priority since non-point sources continue to rank as leading causes of water pollution. Pervious concrete is considered a successful Low Impact Development (LID) technology and has been increasingly used as a stormwater BMP for parking lots, sidewalks, and other applications. It also has other environmental benefits such as traffic noise reduction, urban heat-island mitigation, and groundwater recharging. Replacing Portland cement binder with fly ash (a byproduct of coal combustion in the generation of electricity) and traditional aggregates with ground waste glass has the potential to reduce costs and emissions, save energy, and reduce landfill waste. The utilization of nanotechnology to enable expanded use of waste and recycled materials is an unexplored area with great potential. *The objective of this project* is to advance scientific knowledge in the utilization of nanotechnology to expand the use of industrial waste and recycled materials in pervious concrete and in the potential of such "greener" pervious concrete for the treatment of deicer-laden stormwater under a variety of contaminant loading scenarios. In other words, more environmentally friendly pervious concrete mixes will be evaluated as a reactive BMP for deicer stormwater management. The innovation is inherent in the use of multi-scale modified "green" cementitious binder and low-cost materials and waste materials in a synergistic manner.
Describe Implementation of Research Outcomes (or why not implemented)	This project will produce at least one paper for presentation at TRB annual meeting and publication in a peer-reviewed journal. One patent application will be filed out of Phase II of this project. Building on the success of this research, field operational tests will be conducted as part of a follow-up study. The team will work clsoely with local communities/agencies to field test the new "greener" pervious

	concrete. *Prospective users of the research product* include: owners and maintainers of pervious concrete pavement (including highway agencies), engineers, architects, contractors, and other stakeholders (including maintenance practitioners) with improved understanding pertinent to the functionality, cost-effectiveness, durability, and maintenance requirements of such assets.
Place Any Photos Here	 
Impacts/Benefit of Implementation (actual, not anticipated)	The project fits under the CESTiCC research thrust of "*managing stormwater runoff in cold climate through improved training,monitoring, advanced technology, and pervious concrete".* It also meets the USDOT strategic goal in environmental sustainability as it helps "a*dvance environmentally sustainable policies and investments that reduce harmful emissions from transportation sources"*. This work is expected to produce substantial benefits for DOTs, county and city stakeholders. Pervious concrete enables the use of space that is already part of the highway system for stormwater runoff control, thus reducing the need for additional land. Reducing the amount of impervious surfaces may reduce or prevent the need for other stormwater management infrastructure (e.g., ponds, wetlands, and vegetated swales and filter strips), by decreasing the volume, flow rate and contaminant loading in stormwater runoff. Other potential benefits include: reducing heat-island effect and pavement noise; reducing hydroplaning, glaring or other safety hazards due to water on pavements; and minimizing impact to the local ecosystem. The expanded use of fly ash and other recycled materials in concrete will

	also be enabled. Application of results could contribute to globally significant environmental parameters including: improved water quality, reduced waste and greenhouse gas emissions, and reduced natural resource extraction.
Web Links • Reports • Project website	http://cem.uaf.edu/cesticc/research/projects/environmentally-friendly-pervious-concrete-for-treating-deicer-laden-stormwater.aspx