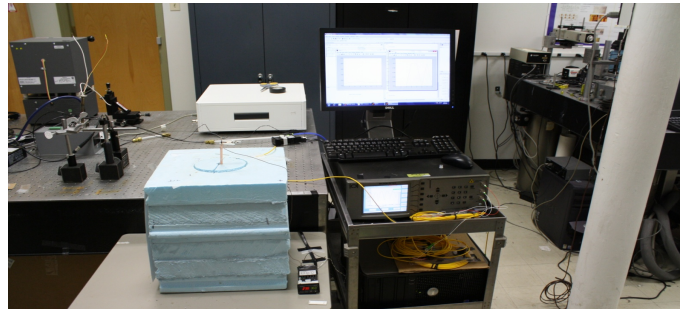
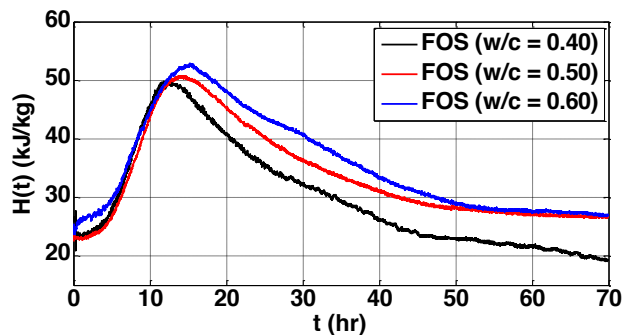
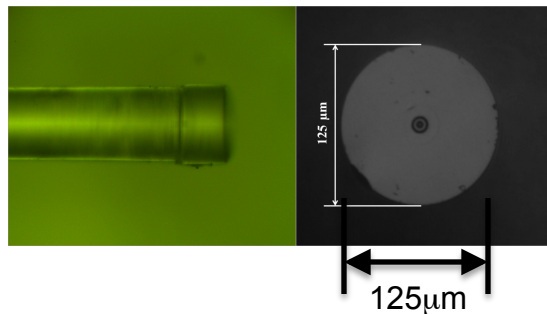
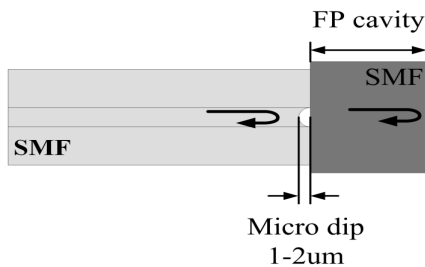


- Abstract:** Cement hydration is the most important process in the manufacturing of Portland cement concrete structures. Cement hydration heat usually provides insightful information about the status of chemical reactions in cement hydration. In this study, internal cement hydration heat was monitored by a new fiber optic temperature sensor, in collaboration with researchers from the Dept of Electrical and Computer Eng (ECE) at UMass Lowell. Experimental measurements were made and used to model cement hydration heat.

- Experiment:** An adiabatic chamber was custom-built in the concrete laboratory and used to measure the early-age cement hydration heat. Time-dependent hydration heat $H(t)$ was calculated from concrete specimens of various water-to-cement ratios (0.4, 0.5, 0.6).



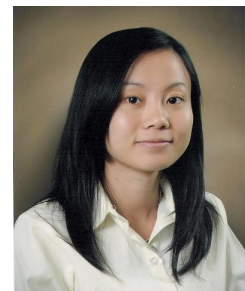
- Fiber optic temperature sensor:** Made by PhD student X. Zou and Prof. X. Wang from ECE.



- Conclusions:** i) Heat of hydration is dependent on concrete temperature and apparent activation energy; ii) Potential heat of hydration increases from lower to higher water-to-cement ratios.

- Ref:**

- **Chao**, A., Master's Thesis, Dept. of Civil & Envir. Eng, UMass Lowell, December, 2011.
- Zou, **Chao**, Tian, Wu, Yu, Wang, *Measurement*; 45:1077-1082, 2013.
- Zou, **Chao**, Tian, Wu, Yu, Wang, *Smart Structures and Systems*; 12 (1): 41-54, 2013.



Alice Chao