

Real-time Monitoring of Formaldehyde Concentrations in the Built Environment

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Background and Aims: Volatile organic compounds (VOCs) are a major concern in indoor air quality investigations and formaldehyde, in particular, is the subject of considerable environmental health and monitoring research [1,2, 3]. New regulatory standards are focused on reducing formaldehyde levels in both residential settings and building materials manufacturing. In order to develop new tools to meet lower national thresholds [4], there is need for research on the design, implementation and testing of a wireless formaldehyde monitoring systems. The objectives of this research are to 1) compare the performance of commercially available sensors within the network architecture, 2) identify fine scale spatio-temporal patterns in formaldehyde emissions, and 3) provide improved information integration models for the assessment of environmental and personal exposure events.

Methods: (Arial, 8pt, bold) The formaldehyde monitoring system consists of wireless sensor nodes, a base station, a Sensor Observation Service (SOS), a database system, and a web-based user interface. Sensor nodes collect data and then pass it to the Sensor Observation Service (SOS) that provides a web-based user interface to enable users to view the latest sensor readings and historical analysis results.

Results: (Arial, 8pt, bold) Although the full results of this prototype system will not be available until current testing is completed this spring, anticipated issues this research will be able to address include: efficient and effective wireless communication configurations, comparison of data storage and processing methods, representation of conceptual model that can adequately capture both personal exposure and general area exposures, and ensuring effective user interface design.

Conclusions: (Arial, 8pt, bold) Applications of this research will benefit manufacturing industry and wood composite researchers as they move towards producing materials with lower formaldehyde emissions as well as the environmental epidemiology community looking for new tools and methods for collecting and analyzing the longitudinal impact of formaldehyde exposure at lower levels.

References: (Arial, 8pt, bold)

[1] WHO IARC, IARC Monographs on the Evaluation of Carcinogenic Risks to Humans: Formaldehyde, 2- Butoxyethanol and 1-tert-Butoxypropan-2-ol, 2006.

[2] US EPA, Formaldehyde (CASRN 50-00-0), 2005.

[3] M. M. Loh, J. I. Levy, J. D. Spengler, E. A. Houseman, D. H. Bennett, Ranking cancer risks of organic hazardous air pollutants in the United States., *Environmental health perspectives* 115 (2007) 1160–8.

[4] California Environmental Protection Agency Air Resources Board, Proposed Airborne Toxic Control Measure