webinar
2021.10.12

Smart materials for energy efficient IAQ management


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EBC Energy in Buildings and Communities Programme ANNEX 86

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Time	Activity
14:00	**Welcome and introduction** Menghao Qin – DTU, DK
14:10	**Metal-organic Frameworks for indoor environment control** Menghao Qin – DTU, DK
14:30	**Passive Removal Materials for Indoor Air Improvement: Performance Evaluation and Modeling** Doyun Won & Mitra Bahri – NRC, CA
14:50	**Electrospun fibers for Supply Air Filtration in residential buildings,** Alireza Afshari – AAU, DK
15:10	**Impact of VOC and moisture buffering capacities of bio-based building materials on IAQ and indoor RH: the case of hemp concrete** Anh Dung TRAN LE –UPJV, FR
15.30	**Discussion** Jensen Zhang – SU, USA
15.45	**End of meeting**

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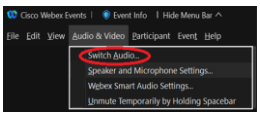

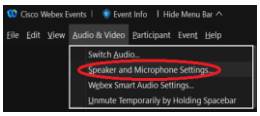

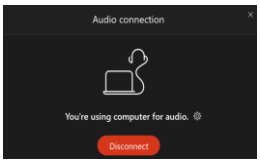

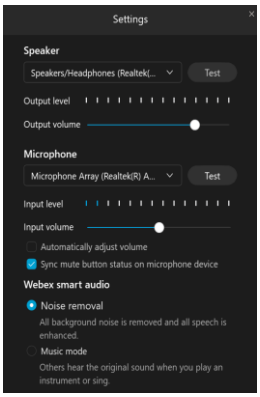

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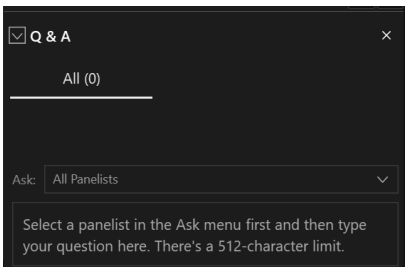

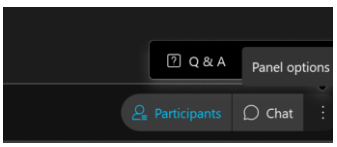

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DTU

IEA Annex 86 Subtask 3

Smart materials as an IAQ management strategy

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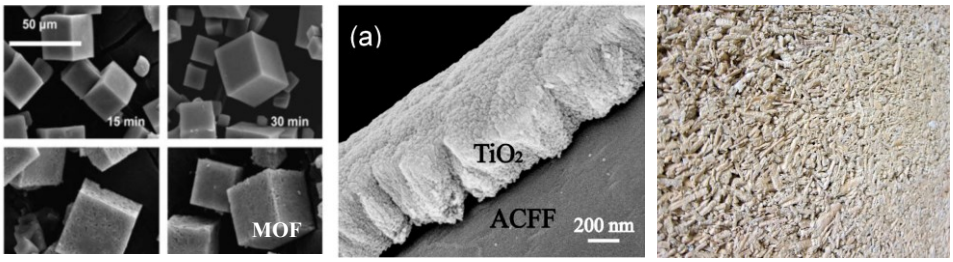
General description

- ST 3 identifies opportunities to use novel materials (from advanced functional nano-materials to bio-based building materials) as building components to actively/passively manage the IAQ, for example, through active paint, wallboards and textiles coated with advanced sorbents or catalysts and quantify their potential based on the assessment framework developed in ST 1.



Activities

- **A3.1 Material properties and characterization of the products**

Literature survey and laboratory testing to gather relevant data and existing knowledge about properties for transport, retention, and adsorption of chemical substances and moisture in new functional materials (e.g. Metal-organic frameworks (MOFs), photo-catalysts, precise humidity control material (PHCM), hemp concrete, etc.). The synergistic effect of VOC and moisture on the removal performance of the new materials will be studied.

- **A3.2 Modelling of the behaviour under typical residential conditions**

Model setup and laboratory tests to analyse the performance of the new materials for IAQ control in residential buildings. The behaviour of the materials over time under different climates will be analysed and corresponding control strategies for IAQ management will be developed.

- **A3.3 Assessing energy-saving and exposure reduction potential**

Numerical simulations to study the energy-saving and exposure reduction potential of the new smart materials in residential buildings under different climatic conditions.

• Stakeholders involved:

- Manufacturers of building materials shall be involved regarding testing and possible co-development of products that have a function to absorb indoor pollutants.
- Building designers, health organizations, and technological institutes who make testing for industry and run their labelling systems are also among potential stakeholders.

• Deliverables:

- D3.1 A comprehensive review of ad/desorption and transport properties of the smart materials developed in the project for IAQ control.
- D3.2 Mechanistic models for estimating the energy-saving and exposure reduction potential of the new materials under realistic environmental conditions. The data and models will be published in scientific journal articles and a project report.
- D3.3 A test method for evaluating VOC removal performance of the new materials under a realistic built environment.

Participants

AAU (DK), Aalborg University
BBRI (BE), Belgian Building Research Institute
BUCEA (CN), Beijing University of Civil Engineering and Architecture
CSIRO (AU),Commonwealth Scientific and Industrial Research Organisation
DTU (DK), Technical University of Denmark
ESPCI (FR), ESPCI Paris - PSL University
GU (BE), Ghent University
IPV-FEUP (PT), Polytechnic Institute of Viseu (IPV) and University of Porto (FEUP)
KUL (BE), KU Leuven
LBNL (USA), Lawrence Berkeley National Laboratory
MatNova (BE), Material Nova
NJU (CN), Nanjing University
NRC (CA), National Research Council
SJTU (CN), Shanghai Jiao Tong University
SU (USA), Syracuse University
TJU (CN), Tianjin University
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UPJV (FR), University of Picardie Jules Verne