

【Grant-in-Aid for Young Scientists(S)】
Science and Engineering (Engineering II)



Title of Project : Prediction and Control of Human Exposure of Indoor Aerosol Based on Public health Engineering Approach

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Research Area : Engineering, Architecture and Building Engineering

Keyword : Air environment, Environment designing

【Purpose and Background of the Research】

The “quality” problem regarding the overall indoor environment is called IEQ (Indoor Environmental Quality) and this area has been attracting increasing attention with the increasing health consciousness of residents.

The research project ‘Prediction and control of human exposure of indoor aerosol based on public health engineering approach’ is based on the methods both environmental engineering and the public health science, and deals with prediction and control of IEQ and health risk totally.

【Research Methods】

This research focuses on indoor aerosol pollution issues that have a large influence on the health risk of indoor residents. Target pollutants are secondary organic aerosols derived from gas phase chemical reaction and bio-aerosols generated from metabolic response of microorganism existing indoor environment. This research field is composed of indoor physics, indoor chemistry and indoor biology, and the implementation of comprehensive and interdisciplinary research is required.

In this research, the following three research projects will be accomplished.

(1) Development of numerical prediction method of indoor air pollution with various indoor aerosols;

- To develop the fundamental model which predict chemical reaction, nucleation and condensational growth, charged effect, deposition and emission of indoor aerosols
- To develop the numerical model that predict microorganism growth and bio-aerosol / MVOC emission by taking into account the influence of environmental factors
- To develop procedure for coupled analysis of virtual manikin (computer simulated person), flow, temperature, moisture and pollutants

(2) Field survey and epidemiological analysis of indoor air pollution with various indoor aerosols;

- To investigate actual condition of indoor aerosol pollution in residence (for long-term stay) and in large enclosure such as airport lobby and station (for short-term stay).
- To quantify dose-response relationship between indoor various aerosols and resident by field survey

(3) Establishment of health risk assessment method and new research field “Public Health Engineering”;

- To establish a paradigm ‘Public Health Engineering’ for the integrated design of indoor environment that takes into account the detailed numerical prediction based on engineering approach and health risk assessment based on public health science approach

【Expected Research Achievements and Scientific Significance】

This project will contribute to establish a numerical method to predict inhaled air concentration and health risk of indoor aerosols. Through this project, it is also expected that the results of this research project will contribute to the development of new research field “Public Health Engineering”.

【Publications Relevant to the Project】

Ito K, Numerical morphological analysis of fungal growth based on a reaction - diffusion model, *Biocontrol Science*, Vol.14, No.1, 21-30, 2009

Ito K, Fundamental chamber experiment on indoor SOA derived from ozone / VOC reactions, *Journal of Asian Architecture & Building Engineering*, vol. 7, no.2, 419-425, 2008

【Term of Project】 FY2009-2013

【Budget Allocation】 48,600 Thousand Yen

【Homepage Address and Other Contact Information】

<http://www.eee.kyushu-u.ac.jp/hlabo/>