Indoor bioaerosol monitoring using an electrostatic bioaerosol sampler and MALDI-TOF mass spectrometer

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Introduction

Sampling and identification of bioaerosol which can affect human health by causing infectious diseases, acute toxic reactions, and allergies are needed to assess indoor air quality.

Electrostatic sampler is most efficient equipment to collect airborne particles which are electrically charged and then removed from the air stream by an electrical field.

MALDI-TOF mass spectrometry is reliable and fast technique used for identification of microorganism. In the MALDI technique, a unique mass spectral fingerprint is produced from extracted bacterial proteins. It is then compared with the existing database and identified to the genus or species level based on the degree of match [1].

In this study we monitored indoor bioaerosol diversity using electrostatic sampler and MALDI-TOF mass spectrometer (MS).

Materials and Method

The electrostatic sampler consists of a wire-rod corona charger and a cylindrical collector. During sampling, air enters the collector through the wire-rod charger causing particles in the air to become positively charged. Next, the charged particles are collected on the collecting rod by an externally applied electric field [2].

Figure 1 shows the processes of the experiment. After sampling the indoor bioaerosols, the rod is removed and washed in de-ionized water with vortexer. Then, microorganism containing water is spread on prepared agar plates and grown in an incubator for 24h. Subsequently, grown microorganisms are picked up and mixed with matrix solution then spotted onto a MALDI plate. Then run the mass spectrometer and data are compared with existing database.

Results

Figure 2 shows the results of the field sampling test conducted in a hospital. Figure 2 (a) shows incubation result of 1 h of sampling and incubating on anaerobic condition (brucella agar). *M. sp* and *M. aurum* were detected. Figure 2 (b) shows incubation result of 1 h of sampling and incubating on aerobic condition (choco agar). *M. sp* and unknown microorganism were

Figure 1. Processes of field test for indoor air monitoring.

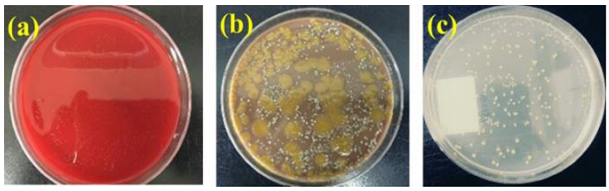

Figure 2. (a) incubating result on brucella agar, (b) incubating result on choco agar, (c) incubating result on SAB agar in a hospital.

detected. Figure 2 (c) shows incubation result of 1 h of sampling and incubating on aerobic condition (SAB agar). *Pseudomonas luteola* was detected.

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