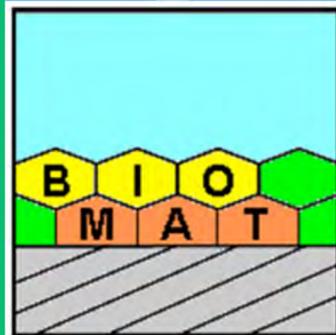




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Bioingeniería y
Materiales

Abstract

A portable device for collecting airborne particles with autonomous operation, comprising a container (1) having an inlet (2) of air from outside into the container (1), and an outlet (3) of air from inside the container (1) to the outside; so that between the inlet (2) and outlet (3) of air, the container (1) comprises, inside, a first module (7) for capturing airborne particles, which in turn comprises: a first means of filtering (4) for the air, allowing the passage of air and particles smaller than the pore size; and a first receptacle comprising, in turn, a first plate (5) covered with a tacky substance or other adhesive surface on its anterior major surface and configured to collect, at least, part of the particles present in the air (**Fig. 1**).

Overview

In addition to gases and inorganic particles, the air carries many biological particles such as pollen, fungi, bacteria and viruses. Some can trigger allergy symptoms in the population and be also the cause of airborne disease transmission like the flu, pneumonia and legionellosis. Crops and farm productivity are also affected by these airborne organisms, causing an important economic impact. The monitoring and detection of all this biological diversity in the air outdoor is a difficult task because of their particular characteristics regarding size, relative abundance, residence time in the atmosphere... Hence, the different biological particles are usually studied independently.

To solve these troubles, we have developed an equipment attachable to any kind of vehicle to collect all the biological particles present in the air (sorting by size if desired), and keeping the sample intact for further biochemical detection (e.g. DNA sequencing) or identification by microscopy.

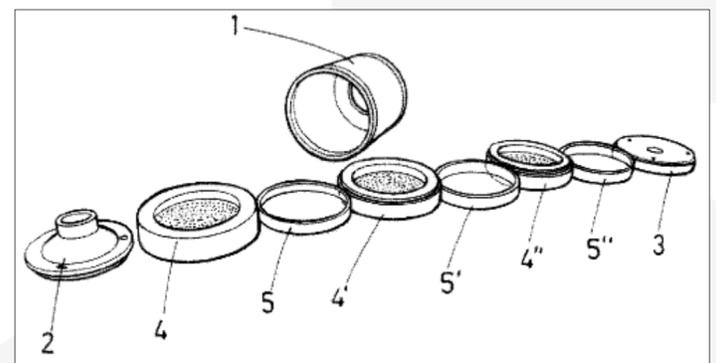


Fig. 1 Scheme showing the components of the device.

Main features of the invention

1) Autonomy and simplicity

Collection is performed passively, promoted by the advance of the vehicle, forcing the air to pass through the equipment. The particles are harvested and retained inside the device on an adhesive surface. Therefore, electric power is not required and the operating time is unlimited.

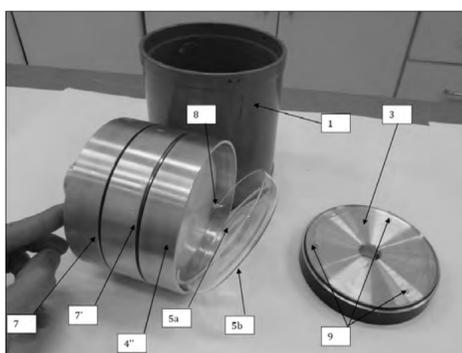


Fig. 2 Picture of the modules and the different parts of the device.

2) Modular structure

The filtering (4) and collection (5) components have a modular organization (7), so it is possible to add or remove modules in order to increase the collection surface or select different size for the particles to harvest in each module (**Fig. 2**).

3) Reusable: brand-new

The prototype is made of metal and glass to be cleaned easily and sterilized in the autoclave, so the components can be used over and over to collect fresh samples.

4) Built to be linked to any vehicle

The cylindrical design, small size and light weight make it simple to attach to many platforms and different means of transport such as cars, buses, airplanes, UAVs, ships... (**Fig. 3**), increasing the options of collection times and the places where the air samples can be taken.

5) Upgradable

Additional features like lids to control the collection, a flow-meter coupled with a data-logger to monitor the volume of air sampled, the use of disposable collection receptacles... can be easily integrated in the equipment to improve its performance.



Fig. 3 Pictures of the equipment attached to different vehicles.

Patent information

Title: Dispositivo captador de partículas presentes en el aire de carácter portátil y autónomo.

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