



KOREA INSTITUTE OF  
MACHINERY & MATERIALS

# Press Release

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## From Diagnosis to Rehabilitation, a Single Device to Manage the Chronic Respiratory Diseases!

- KIMM Department of Medical Devices develops a complex breath analysis system  
for monitoring chronic respiratory diseases -

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☐ With the recent growing interest in respiratory health management due to environmental pollution, smoking, and the spread of viruses, a health management system that can efficiently manage the chronic respiratory diseases – one of the most expensive diseases to treat – is developed for the first time in Korea.

- ☐ The Korea Institute of Machinery and Materials (KIMM, President Sang Jin Park), an institution under the jurisdiction of the Ministry of Science and ICT, has developed a modular respiratory health management system that uses a single device to self-diagnose and manage various chronic respiratory diseases, such as asthma and chronic obstructive pulmonary disease (COPD).
- ☐ The development of a small modular respiratory health management system by KIMM research team, led by senior researcher Dr. Dongkyu Lee of the Department of Medical Devices at the Daegu Research Center for Medical Devices and Green Energy, allows the effective diagnosis, treatment, and management of various chronic respiratory diseases.
- ☐ This newly developed respiratory health management system is constructed as the modular device. The device allows for the replacement and combination of modules between diagnosis module and treatment modules according to the purpose. Also, by using the mobile application, it can easily manage the history of diagnosis, treatment, and rehabilitation.
- ☐ Until now, in order for the diagnosis, management, treatment, and rehabilitation of respiratory diseases, one had to visit a hospital or separately purchase expensive medical devices. However, the development of this new system allows the continuous management of data from a single device for the multi-purpose rehabilitation treatments.
- ☐ The treatment module is capable of providing phototherapy, inhalation/aerosol therapy, and nebulizer therapy, and the rehabilitation module can also allow for the training of respiratory muscles for rehabilitation training.
- ☐ A breath analysis module can simultaneously measure the peak expiratory flow rate, forced expiratory volume, FeNO (exhaled nitric oxide gas), and acetone gas concentrations, which are all essential for monitoring respiratory diseases such as asthma and COPD. Currently commercialized medical diagnostic devices for asthma can only measure FeNO, but the newly developed module can also measure acetone concentrations, as well as can conduct various

pulmonary function tests, such as peak expiratory flow (PEF), forced expiratory volume per second (FEV1), and forced vital capacity (FVC).

- ☐ The accuracy of exhaled gas concentration measurements was improved by applying a complex correction algorithm that utilizes data on exhaled compound gases, high expiratory flow rates, and humidity. Also, based on data collected during the monitoring process, an efficient treatment and rehabilitation guide for health management can be provided using artificial intelligence.
- ☐ In preclinical trials, the Department of Pulmonary Medicine at Seoul National University Bundang Hospital conducted comparative experiments using the newly developed diagnostic module against pre-existing medical devices for asthma. Moving forward, there are plans to promote ongoing technological cooperation for the clinical progress and commercialization of all modules.
- ☐ KIMM senior researcher Dr. Dongkyu Lee expressed his expectations that this newly developed technology will greatly facilitate self-management of respiratory diseases, including the diagnosis, treatment, and rehabilitation training for patients suffering from chronic respiratory diseases. He also emphasized that the research team at KIMM will continue to do its best in collaboration with industries and medical institutions to conduct the necessary research and development necessary to help people lead healthy lives.

#### **[List of Attachments]**

- Attachment 1: Complex system for treatment, breath analysis, and rehabilitation of chronic respiratory disease (Photo)
- Attachment 2: Patent application and technology transfer status

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**The Korea Institute of Machinery and Materials (KIMM) is a non-profit government-funded research institute under the Ministry of Science and ICT. Since its foundation in 1976, KIMM is contributing to economic growth of the nation by performing R&D on key technologies in machinery and materials, conducting reliability test evaluation, and commercializing the developed products and technologies.**

This project was carried out with support from the National Research Council of Science & Technology as part of a project that aims to build the foundations for technological innovation in robotics field clinics that are customized for medically marginalized populations. The commercialization of this project is being supported and promoted by the Ministry of SMEs and Startups, as part of its project to develop a multi-purpose healthcare system capable of providing smart respiratory performance testing and respiratory training treatment for home use.

**Credit :** The Korea Institute of Machinery and Materials (KIMM)

**Usage Restrictions of Multimedia (Attachment File) :** The sources of photos and research results from KIMM must be specified.

**- Attachment 1: Complex System for Treatment, Breath Analysis, and Rehabilitation of Chronic Respiratory Disease (Photo)**

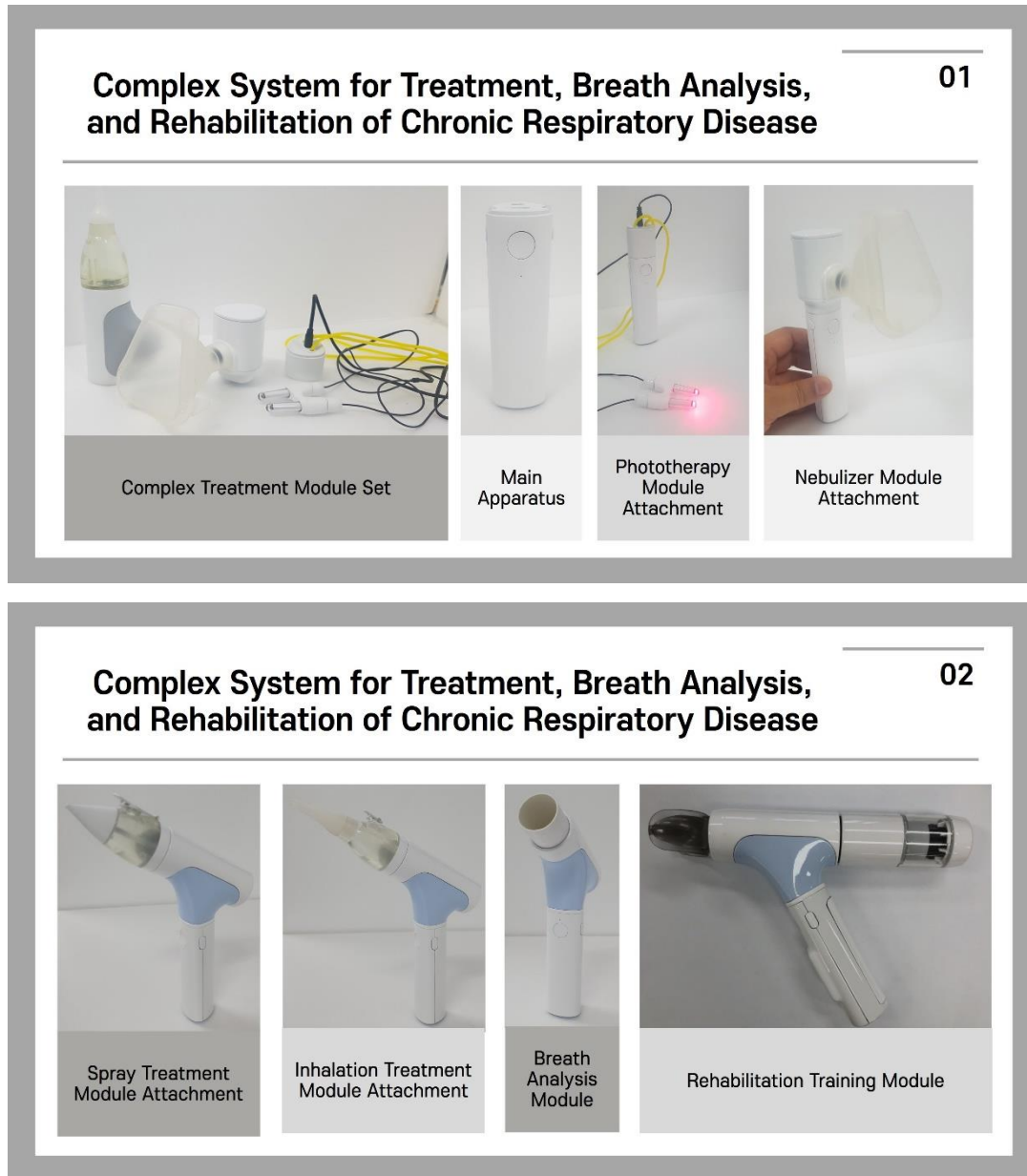


Photo description: The complex system for treatment, breath analysis, and complex rehabilitation of chronic respiratory disease developed by the KIMM research team, led by senior researcher Dr. Dongkyu Lee

## **- Attachment 2: Patent Application and Technology Transfer Status**

### **<Patent Application>**

- Apparatus and Method for analyzing breath gases using multi-sensor (10-1817752)
- ANALYSIS METHOD OF SINGLE BREATH AND ANALYSIS DEVICE OF SINGLE BREATH (10-1905067)

### **<Technology Transfer>**

- Apparatus and Method for analyzing breath gases using multi-sensor / INTIN Inc. (20.07.07.)
- ANALYSIS METHOD OF SINGLE BREATH AND ANALYSIS DEVICE OF SINGLE BREATH / HUWANT Co. Ltd. (20.07.01.)