

High Performance Dehumidification Apparatus (Dehumidifier) Significantly Reducing Power Consumption with Functional Surface

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- ⇒ Cooling fin shape design of dehumidifier and surface modification method of cooling fin wettability for improved dehumidification amount
- ⇒ Dehumidification efficiency can be improved by effectively removing water drops condensed on the cooling fin in the thermoelectric module assembly of dehumidifier.
- ⇒ Dehumidifier having the anti-bacterial property in cooling pin and the cooling wind

Client / Market

- Dehumidifier manufacturer, air conditioner manufacturer, HVAC field

Necessity of this Technology

- Current HVAC used moisture absorbent to absorb moisture in the air or used the refrigerant to condense moisture on the surface single wettability in the air for removing moisture from the atmosphere. It has a room for improvement in the efficiency aspect.
- Absorption dehumidifier uses chemical absorbent, and when the absorbent is no longer able to absorb moisture in the air, it needs to be reheated, and additional cost occurs in this process.
- Electric refrigeration dehumidifier uses a fan to make a flow of humid air and converts moisture in the air into water using Freon coolant. An evaporation pin is designed to have single wettability—hydrophobic or hydrophilic—or low qualified wettability, which requires a lot of energy consumption.
- An energy efficient dehumidifier must be developed.

Technical Differentiation

- This technology provides the dehumidification technology using a practical high-performance surface
- A hydrophilic material that condense moisture into water drops and a hydrophobic material that let fall down the condensed water drop are combined or each wettability are maintained its wetting property to collect moisture. These surfaces show the better efficiency compared to existing hydrophilic or hydrophobic material surface.

Excellence of Technology

- In this technology, the hydrophilic pattern acts as the core to collect water vapor in the atmosphere, and as water drop forms into a certain size, the drop runs down along the hydrophobic pattern to be collected.
- With various ideas, condensed water drop grows faster.
- Cheap processes are used to realize high performance surface to enable commercialization.
- Contaminants in the cooling fin formed from residual water in the dehumidifier is instantly sterilized with high temperature. (removing the bacteria 100% with the 15-second sterilization)
- The dehumidifier makes the cold wind of temperature of 21.9°C at the outlet of dehumidifier.
- The senior researcher has over 10 years of research experience in the surface improvement field.

DESIRED PARTNERSHIP

Technology Transfer

Licensing

Joint Research

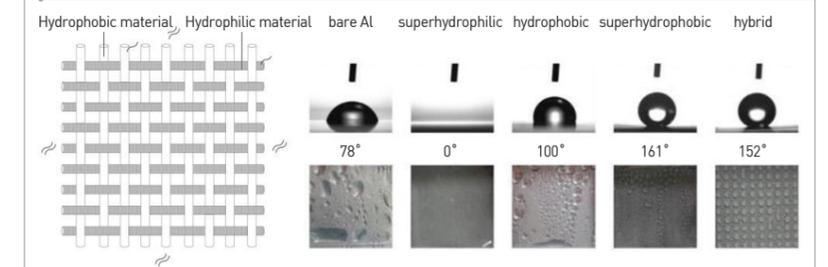
Other



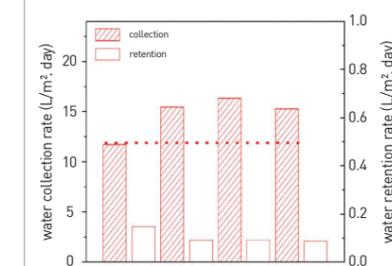
TECHNOLOGY READINESS LEVEL [TRL]

Research, basic explanation | Project concept or idea development | Technology idea verification | Prototype development | Trial product production/evaluation in similar environment | Pilot field demonstration | Development and optimization of commercial model | Commercial product demonstration | Mass production and initial market launch

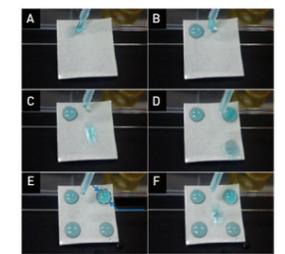
Example of Water Collection Apparatus Using Hydrophilic Pattern and Hydrophobic Pattern



Improved Water Collection Result



Hydrophobic Surface with Hydrophilic Pattern



Current Intellectual Property Right Status

PATENT

- Artificial Tree for Environmental Risk Reduction (KR2018-0025845)
- Thermoelectric Module for Heat Recovery Attachable to Refrigerating and Air Conditioning Apparatus (KR2016-0120604)
- Dehumidifier with Heat Recovery Function (KR1750403)
- Fog Collecting Filter (KR1688982)
- Method and Apparatus for Sterilizing Heat Sink of Thermoelectric Device Assembly (KR1818729)
- Conductible Fin Having Micro and/or Nano Bump (KR1739049)
- Cooling Fin Block and Thermoelectric Module Assembly Having the Same (1688979)
- Cooling Fin Block and Thermoelectric Module Assembly Having the Same (KR1679219)
- Thermoelectric Module Assembly for Dehumidifier (KR1519071)
- Hybrid Heat Conductible Pin with Hydrophilic and Hydrophobic Characteristics and Method Thereof (KR1519071)
- Conductible Fin for Evaporator (KR1303565)
- Moisture Collecting Apparatus (KR1059738)
- Moisture Collecting Apparatus (KR1077939)
- Dehumidifier Design (KR780769)
- Dehumidifier Design (KR780770)

KNOW-HOW

- Fabrication process for hybrid pattern of controlled wettability on aluminum surface (hydrophilic: contact angle below 10° / superhydrophobic: contact angle over 160°)
- Understanding on condensation behavior of various surfaces