

Sorbio - Building fixtures with an integrated active-passive system for regulating humidity in living

Fields of use: Residential buildings. Tourist and hospitality facilities. Cultural and educational institutions. Public and commercial buildings. Smart buildings.

Current state of technology:
prototype (TRL 5)

Intellectual property
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Background.

Excessive indoor humidity is a common challenge in residential, public, and commercial buildings. It increases the risk of mold growth, degrades indoor air quality, negatively impacts occupants' health, and causes damage to building components, equipment, and furniture. The problem is particularly pronounced in energy-efficient buildings, where natural ventilation is often limited.

Existing technologies for dehumidifying spaces are primarily based on compressor-based or sorption systems, which are effective but often consume a lot of energy, generate noise, take up space, and do not blend aesthetically with the interior design. There is currently no solution on the market that combines architectural integration, quiet operation, low energy consumption, and intelligent humidity control.

Description of the solution.

The invention is an innovative humidity control system that is integrated directly into building fixtures or other interior design elements, such as wall panels, cabinets, picture frames, and decorative elements. The system is based on the use of advanced hygroscopic materials, such as zeolites, metal-organic frameworks (MOFs), hydrogels, or salt-impregnated sorption structures, which effectively absorb excess moisture from the air.

A key feature of the solution is the combination of passive moisture capture and energy-efficient active sorbent regeneration. Regeneration is achieved using integrated heating elements that deliver heat directly to the hygroscopic material, enabling rapid restoration of its moisture-binding capacity with minimal energy consumption. The system can also include humidity and temperature sensors, IoT connectivity, and advanced algorithms for intelligent operation management based on room conditions and user habits. Prototype uses low noise ventilators.

The solution thus enables discreet, energy-efficient, and architecturally unobtrusive humidity control without the use of refrigerants, large mechanical systems, or modifications to the existing building.



Main advantage.

- exceptionally low energy consumption, achieved through the use of advanced sorption materials and direct heating of the hygroscopic structure during regeneration,
- quiet operation without compressors, fans, or refrigerants, which improves living comfort and reduces maintenance requirements,
- seamless integration into building fixtures and interior furnishings, without taking up additional usable space or requiring complex construction work,
- smart humidity management that uses sensors, IoT connectivity, and machine learning algorithms to optimize performance based on actual conditions in the room,
- reduces the risk of mold growth and structural damage, improves indoor air quality, and extends the service life of buildings and equipment,
- a sustainable solution for modern buildings, suitable for energy retrofits, smart homes, and low-carbon building concepts.

