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OO/UC3M/32 - COMPACT DEVICE FOR MASS TRANSFER BETWEEN LIQUID FILMS AND VAPOUR OR GAS

University Carlos III of Madrid (Spain) offers a method and device for mass transfer between liquid and vapour or gas. Applications to absorbers and desorbers in absorption chiller technology, evaporators, condensers and chemical reactors.
The research group is trying to find companies for further development, commercial viability assessment and commercial exploitation.

Description of technology
Method and device for high efficiency mass transfer between liquid and gaseous phases in a reduced volume. The performing of the device working as condensator and evaporator is equal than functioning as absorber and desorber, respectively. However, in these later examples the chemical specie to condense or evaporate are the same than the one present in the liquid, thus not occurring absorption by only phase change. Mass transfer efficiency in this device can reach very high levels, besides heat transfer between the liquid film and exterior air can be accomplish not requiring intermediate fluid and subsystems. Both hardware configuration and operation are simple, and no expensive components need to be devoted during the device construction. When comparing this other competing technologies, the use of this device allows an increase of operation efficiency and a reduction of volume in absorbers, desorbers (generator) of absorption chillers and also in evaporators, condensators, gas cleaning, chemical reactors, among other mass transfer devices.

Innovative aspects
High mass transfer efficiency, small volume, constructive and operative simplicity, direct air cooling. - Ultra-thin and stable film attached to a solid surface - Very compact and small device - High mass transfer efficiency - Reduced liquid and gas stored inside the device - Insensitive performance to movements and orientation changes - Flow of liquid and gas not based on gravity forces. Thus, the device may operated in microgravity or null gravity conditions. - Efficient controlling of liquid temperature during performance. - Air direct refrigeration or heating of the interior streams, through the walls of the chamber, not using intermediate fluids for it. - Other processes are possible in the device, for example the condensation of a fraction of selected gaseous species on the film in destilation and gas cleaning or washing, or the chemical or catalytical reaction between gas and liquid streams.

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Competitive advantages
- Competitive manufacturing costs: the device requires fewer components and less material than other current alternatives. The technologies involved in the device fabrication are not complex. - Small amount of fluid volume inside the device. This decreases the amount of liquid and gas necessary for the system to work. - Reduced costs of storage and shipping, because of the save on weight and space of the device - Environmental pollution and economic saving during the device lifetime. Less energy resources are consumed, thus reducing the produced pollution and the variable costs. - Sales are increasing on account of the competitiveness of the device. - Trade extension towards new business opportunities in innovative, rising and non-saturated niche markets. - Improved efficiency of heat and mass transfer in a wide range of operating conditions. - Simple hardware architecture and easy to operate device - Reduced number of equipment involved

Current state of intellectual property: ☒ Patent applied

Keywords
Heat storage; Supply and heat transport; Central heating; Heat interchangers; Heat bombs, technologies of refrigeration; Energetic management; Process optimization, Utilization of residual heat; Technologies for drinks.

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