

Water-Repellent Fabrics and Textiles

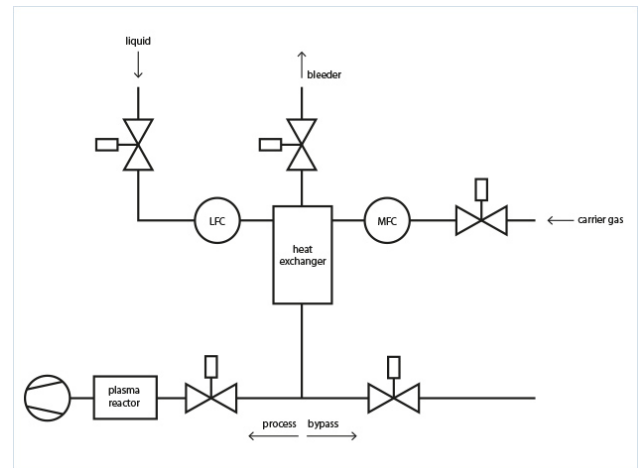
Waterproof yet breathable clothing prevents rainwater drops from penetrating, and at the same time allows perspiration vapour to pass - very desirable when exercising in the rain. And stain-repellent fabrics protect your clothes against coffee, juice or food stains. In both cases, a hydrophobic coating is responsible for the anti-wetting behaviour. How can you make fabrics and textiles hydrophobic or add other functionalities to them without affecting the bulk properties of their fibers?

Empa, part of the Swiss technology institute ETH and devoted to materials research, investigates and applies plasma polymerisation to deposit thin, nanoscale layers on top of fabrics and fibers, in order to functionalise their surface - and more specific: to make them water-repellent. Bronkhorst devices play an important role in this process, especially in the controlled supply of polymer precursors



Process Solution

The Bronkhorst CEM (Controlled Evaporation Mixing) system is used to evaporate siliconorganic HMDSO. In this setup, liquid HMDSO is drawn from a container at room temperature and measured by a mini CORI-FLOW mass flow meter. Then the liquid HMDSO is mixed with argon carrier gas from an EL-FLOW thermal mass flow controller and vaporised inside a heat exchanger for controlled heating. The vapour flow is introduced into the plasma reaction chamber operated at 0,1 mbar absolute pressure. A PLC system controls the entire evaporation process. Using this setup, HMDSO is evaporated in a wide range of 1 to 30 grams per hour. First results show that vapour flows are generated in a stable, accurate, repeatable and wellcontrolled way. LabView software is used to visualise the evaporation process simply and effectively. The currently used CEM system has replaced a traditional and time-consuming bubbler system with a limited low flow rate of carrier gas and precursor. Using the CEM system, Empa obtains a higher yield of 50 ml/min of gas, whereas in the earlier bubbler system only 4-5 ml/min of gas was possible. Likewise the HMDSO liquid flow has been increased. Empa's aim for the near future is to upscale the process, from laboratory scale to industrial scale.



Recommended Products

