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A method for evaluating and controlling the susceptibility of porous media by means of plasma-assisted pre-surface activation processing

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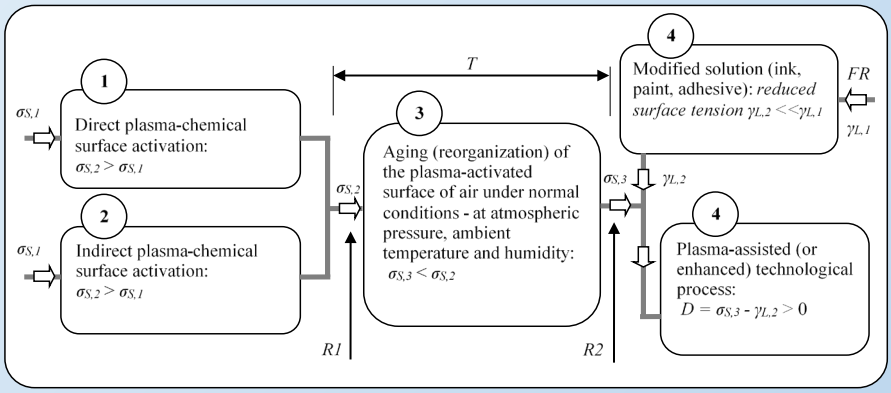
A method was developed at the Technical University of Sofia to assess and manage the susceptibility of porous media, a technological process assisted by preliminary plasma-surface activation (functionalization), for which a patent has been issued in Bulgaria.

Application № 112555



The method for modifying porous media using plasma-chemical surface treatment to enhance their impregnation with aqueous solutions of flame retardants is characterized by its improved efficiency, versatility, universality, dependability, and speed. This method can be applied "out of technological line", meaning it can be carried out "in situ", regardless of the product's geometry and dimensions or the accessibility of its surfaces, such as ceilings, vertical, or horizontal surfaces.

Technical solution

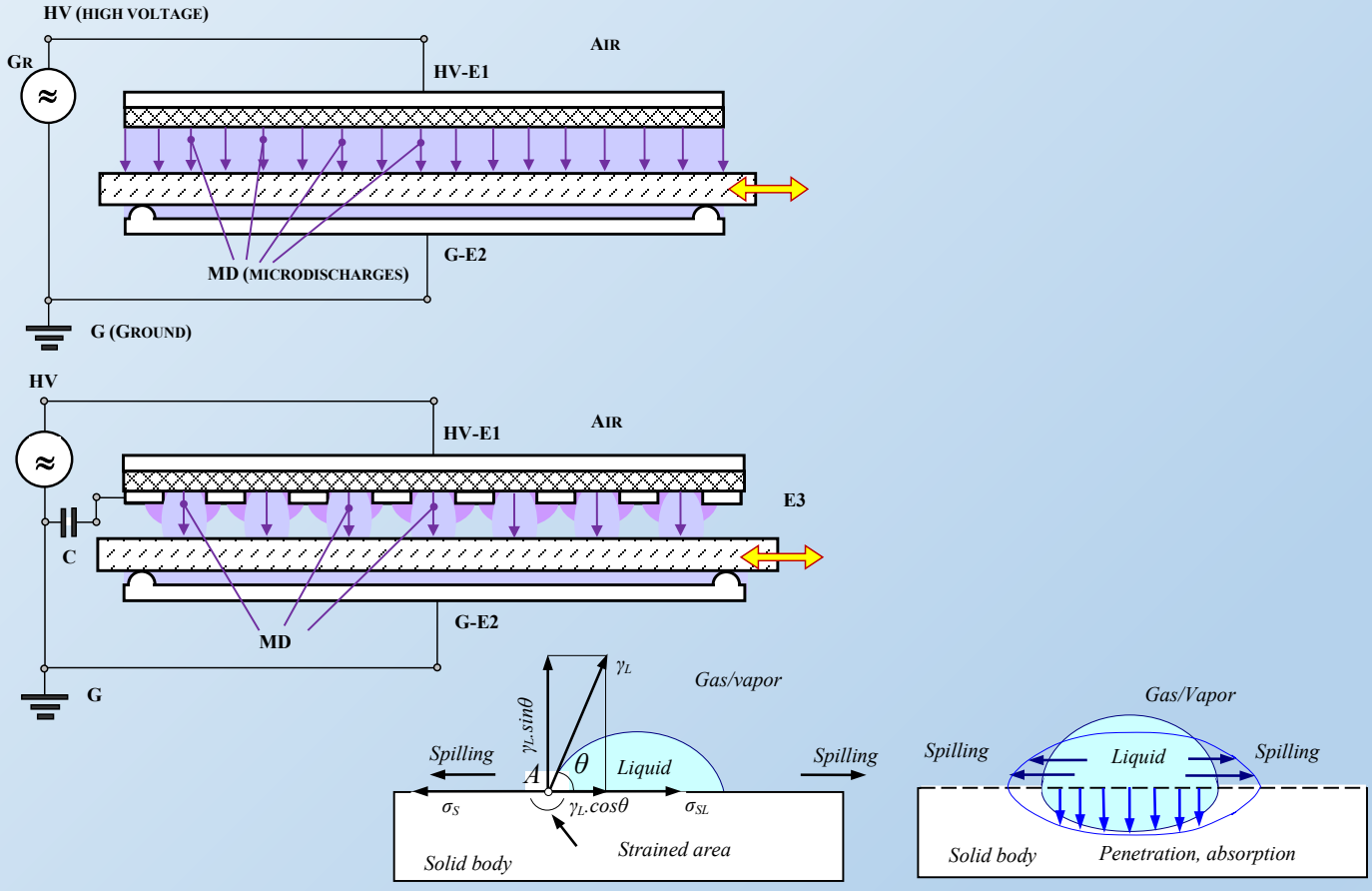
The invention addresses the problem of evaluating and managing the susceptibility of porous media to plasma-assisted technological processes by utilizing a method that involves preliminary surface activation, either through functionalization or oxidation. This method is specifically applied to plasma-assisted surface impregnation that takes place outside the technological line, meaning after the activated surface has been exposed to atmospheric conditions such as normal temperature, pressure, and humidity. The susceptibility of the impregnation surface is measured by comparing the free surface energy at the end of the "open" process time, which indicates the degree of aging of the activated surface, and the surface tension after the addition of a surfactant. The susceptibility control is achieved by increasing the free surface energy after the preliminary plasma-chemical activation and reducing the surface tension of the impregnating solution.

Application and advantages

The method in question demonstrates an enhanced level of technological capability, adaptability, universality, dependability, and swiftness of action. It effectively broadens the scope of plasma-assisted technological processes that can be applied outside of the typical technological line.

This approach is particularly advantageous in safeguarding against the potential for flames to ignite in porous materials and their products. It achieves this by creating a protective, diffuse coating through the process of impregnating these materials with aqueous solutions containing flame retardants. This solution can be applied to a wide range of materials commonly used in residential, commercial, and public buildings, including interior and furnishing elements, staging techniques in cinemas, theaters, and television studios, hotel and restaurant furnishings, as well as various types of building materials and packaging materials - - cardboard, paper, corrugated cardboard, foils, etc.

Technological images



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