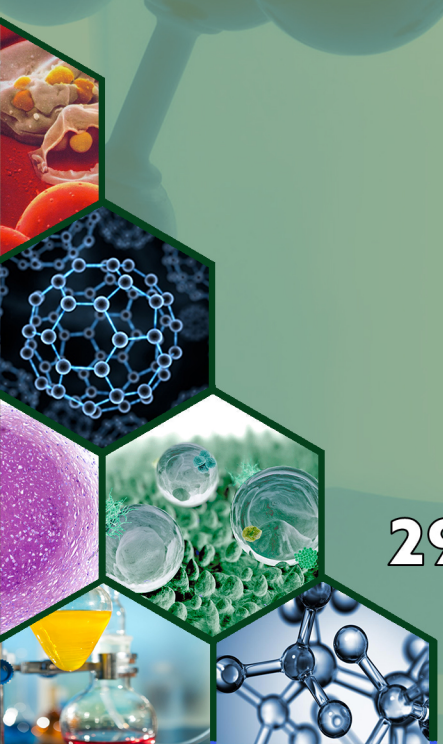
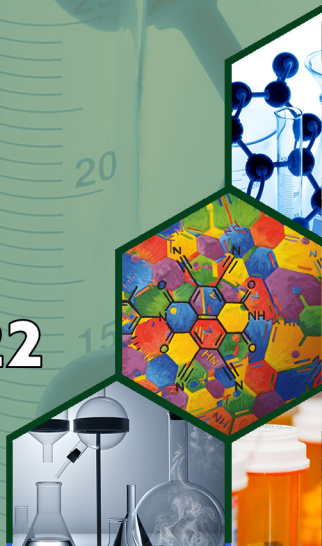
Serbian Chemical Society
Serbian Young Chemists' Club

Eight Conference
of the Young Chemists of Serbia

Book of Abstracts





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MS OP 01

Capillarity of plasma treated jute fabrics

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Jute fibers have a heterogeneous chemical composition that includes cellulose, hemicellulose, lignin, and other minor components. This lignocellulosic fiber is characterized by a complex layered structure with the presence of a hydrophobic surface outer layer consisting of a mixture of waxes and fats. The mentioned hydrophobic surface layer is responsible for fiber's low sorption properties. Therefore, the aim of this study was to enhance the wettability of raw jute fabric by removing the fiber hydrophobic surface layer through a two-step process. The first step includes removing the water-soluble components; raw jute fabric was washed with distilled water at boiling temperature for 30 min and dried at room temperature for 72 h. In the second step, the fabrics were subjected to atmospheric pressure dielectric barrier discharge (DBD) under different conditions (150 Hz and 5.5 kV, *vs*. 300 Hz and 6.0 kV, air as working gas, constant time of 120 s) to remove the hydrophobic layer. Changes in the jute fabrics' surface chemistry were monitored by ATR-FTIR, while the fabric wettability was evaluated by measuring the wetting time and capillarity. The aging effect on the sorption properties of fabrics, in the case of plasma treatment, was investigated up to 28 days following DBD treatment. The obtained results showed that both DBD treatments and aging contributed to the decreased wetting time from 128±8 s for raw jute fabric down to 3.1±0.1 s for a lower frequency DBD treated fabric or even to 1.5±0.1 s after 7 days of aging. Independently on the applied DBD treatment conditions, the jute fabrics' capillarity was significantly improved; *i.e*. their capillary height increased from 87.3 mm for the raw washed jute fabrics up to 138.3 mm and 119.7 mm for a lower and higher frequency DBD treated fabrics, respectively. Although the changes in the fabric surface chemistry were more pronounced for fabric treated with higher frequency DBD, the lower frequency DBD treatment resulted in better sorption poperties. Plasma treated jute fabrics that have improved wettability could be used as geo-prebiotic supports for cyanobacteria growth in a novel solution for damaged land rehabilitation.

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