

Programme & The Book of Abstracts

Twenty-first Annual Conference

YUCOMAT 2019

&

Eleventh World Round Table Conference

on Sintering –

Science of Sintering & Its Future: Fifty Years Later

WRTCS 2019

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Dielectric loss factor of jute woven fabrics: effect of alkali treatment conditions

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In this investigation, the influence of alkali treatment conditions on the dielectric loss factor of jute woven fabric was studied. In that purpose, jute fabric has been alkali treated with NaOH solution (1%, 5% and 17.5%) at room temperature for different periods of time (5 min and 30 min). The jute woven fabric is a heterogeneous three-phase (“fiber-moisture-air”) system, which implies the need for investigation of jute fabric chemical composition, moisture sorption, crystallinity index and structural parameters. The obtained results showed that with increasing the alkali treatment severity, the hemicelluloses content decreased for 14.4-43.3%. In addition, the alkali penetration induced fiber swelling and disrupting of the crystalline regions which result in a decreased crystallinity index. Hemicelluloses removal together with the decreased crystallinity index contributed to the higher availability of cellulose hydroxyl groups which in turns increases the moisture sorption values of alkali treated jute fabrics (for 7.2-21.0%) compared to the untreated fabric. With increasing the alkali treatment severity, the fabric thickness and fabric weight increased, while the fabric porosity decreased. All mentioned properties influence the dielectric loss factor, which is an important fabric parameter related to the ability of the fabric to dissipate electric energy or to convert the electric energy to heat. On such way, the obtained increase of the dielectric loss factor after the alkali treatments (for 2.5-9.2 times) can be attributed to the changes in the fabric structural characteristics and decrease in the content of hemicelluloses and crystallinity index, as well as the increased ability for moisture sorption.

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