



## Sodium Periodate Oxidation of Raw Jute Fabric – A Novel Approach for Tuning the Jute Structure and Properties

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This investigation represents a novel approach for tuning the jute structure and properties using sodium periodate (NaIO<sub>4</sub>) oxidation. The obtained results revealed that the jute fabrics exhibited an increase in the aldehyde group content (for up to 114.7%) with an increase in the NaIO<sub>4</sub> concentration and/or oxidation duration. Due to the decline in the cellulose lateral order index (LOI) and fiber crystallinity index after oxidation, it can be concluded that jute crystalline areas are affected by sodium periodate oxidation. Both mentioned parameters are responsible for fabric mechanical properties, so, it was expected that by decreasing the LOI and jute fibers' crystallinity, their maximum force and stiffness will decrease too. This behavior is also attributed to the fiber damage, which is the most pronounced for the fabric treated with 0.4% NaIO<sub>4</sub> for 120 min. Besides slightly deteriorated mechanical properties, fabrics oxidized with 0.2% NaIO<sub>4</sub> for 60 or 120 min and with 0.4% NaIO<sub>4</sub> for 60 min showed lower mass loss (6.78-12.22%) after 750 abrasion cycles compared to the raw jute (18.94%). Furthermore, oxidation led to obtaining fabrics with enhanced moisture sorption and water retention power that are inversely proportional to the fiber crystallinity. Due to the opportunity for tuning fiber structure and properties oxidized fabrics can be considered for various applications such as geo-prebiotic supports for cyanobacteria growth in biocarpets engineering, i.e., to promote a sustainable relationship between the microbiota and abiotic constituents on the degraded land surface.

**Keywords:** jute, sodium periodate, fiber structure, properties

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