

Short bamboo fibers prepared by super-heated steam treatment for antistatic bio-composites

ABSTRACT

In order to apply short bamboo fiber (sBF) as a functional reinforcement of bio-composites having specific electrical properties, lignin-surfaced sBF was prepared via super-heated steam (SHS) treatment of bamboo. The sBF was easily isolated from the intrinsic fibrovascular bundle structure of bamboo after SHS treatment and pulverization. The isolated sBF was surfaced by brown-colored hydrophobic compounds, which were lignin-derived compounds generated during the SHS treatment. The functional bio-composites were prepared from the SHS-treated sBF and polypropylene and showed specific antistatic properties. Surface electrical resistance values of the composites decreased significantly with increase in the aspect ratio (AR) value of sBF. It is considered that the lignin-derived surfacing of sBF functions as an electron carrier in the composite. In particular, the longer sBF acts as an effective bridge for transporting electrons over long distances along conductive paths. From a cross-sectional microscopic image of the bio-composite, orientated sBFs were observed in its surface layer, supporting the suggestion of conductive path formation. Further, it was confirmed that the reinforcing effect of the presence of sBF was increased with increasing AR value.

Keyword: Short bamboo fiber; Super-heated steam; Lignin-derived compound; Aspect ratio; Antistatic bio-composite; Surface electrical resistance; Fiber reinforcement