Flame Retardants from Bio-derived Materials for Aviation Textiles

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The need for environmentally friendly flame retardants for use in textiles has been growing over the past few decades. Fabrics made of Nylon 66, and Cotton and their blends are being used in everyday life for various applications including uniforms, upholstery materials, tent materials and the aviation industry. Even though these fabrics offer unique properties such as good mechanical properties, comfort etc., they are combustible. Nylon fabrics upon ignition tend to melt and drip carrying the flames with them thereby increasing the risk of fire spread, cellulose-based fabrics, on the other hand, have lower ignition temperatures (350-450 °C) and tend to burn away completely if it has not been treated with flame retardants. To address these issues, several chemistries have been developed using bio-derived or environmentally safer materials including tannic acid, phytic acid and acrylamide as possible flame retardants for cotton and nylon fabrics. The fabrication process and the testing and characterization results including spectroscopic data, thermal decomposition, heat release characteristics, vertical flame performance and the launder durability of the treated fabrics will be discussed in detail during the conference.