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High speed electrical measurement for roll-to-roll nanomanufacturing NATHAN ORLOFF, CHRISTIAN LONG, JAN OBRZUT, National Institute of Standards and Technology, LAURENT MAILLAUD, FRANCESCA MIRRI, Rice University, THOMAS KOLE, Georgetown University Hospital, ROBERT MCMICHAEL, National Institute of Standards and Technology, MATTEO PASQUALI, Rice University, STEPHAN STRANICK, J. ALEXANDER LIDDLE[1], National Institute of Standards and Technology — Roll-to-roll processing of nanomaterials can produce high-quality coatings and filaments continuously, enabling materials applications for electronics, fabrics, and wires. These applications often require specific electrical properties that are correlated to the material's nanostructure. While several high-throughput structural characterizations techniques exist, there are relatively few contactless options for quantifying the electrical properties of materials for nanomanufacturing. Here, we demonstrate a microwave method for measuring complex permittivity (or geometry for samples of known dielectric properties) in a millisecond. The demonstrated measurement times are suitable for current industrial needs, allowing real-time materials characterization and in-line control of processing variables without disrupting production.

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