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Editorial

Foreword to the Special Issue on Terahertz Nondestructive Testing

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It is my pleasure to introduce this Special Issue on "Terahertz Nondestructive Testing", one of the most promising new technologies to be applied to non-destructive inspection problems. The main questions from the NDT community—what can it be used for, how good is it and what are its limitations—are addressed in the papers contained in this Special Issue. Terahertz frequencies in the electromagnetic spectrum result in wavelengths in a similar range to those used in ultrasonic NDT; these wavelengths are highly appropriate for multi-layer composite inspection as they are of the order of a ply layer thickness and result in resolutions, both in-plane and out-of-plane, that can characterise most material variations and detect most defects that are of interest to researchers [1]. Propagation in conducting materials is not possible; so this rules out carbon fibre composites, but glass, aramid, boron and other non-conducting fibre composites are still inspectable. However, attenuation is material and frequency dependent and can be an important limiting factor. As the Terahertz waves are sensitive to the dielectric constant of the materials through which they pass, there is good sensitivity to the geometry of the layer structure, such as layer thickness and wrinkling of plies, as well as to deviations in the material itself due to contamination, chemical changes or moisture ingress, and to defects such as delaminations and disbonds [2,3]. The Terahertz method has also been used to measure the conductivity of thin layers of some materials such as conductive polymers, printed electronics and solar cells [4]. Whilst it is still early in the evolution of this method for NDT, clear potential exists for its targeted application to the benefit of several industries [5–7]. I am sure that the papers contained herein will enlighten the path to future Terahertz applications.

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