

Nondestructive terahertz imaging of composite materials

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The terahertz region (0.1-10 THz) is an electromagnetic wave region between radio frequencies and optical frequencies and is attracting attention as a band for next-generation wireless communication and non-destructive testing. Like radio waves, terahertz waves can pass through a variety of substances, including paper, fabric, plastic, wood, bone, fat, different powders, and dried nutrients. In the case of testing composite materials and insulators, accurate and efficient inspection is not possible because electromagnetic waves in the frequency band of existing non-destructive testing methods do not penetrate through these kinds of materials. Terahertz radiation, on the other hand, penetrates through composite materials and insulators with comparably little loss. Since there are no suitable non-destructive testing methods available for composite materials and insulators, terahertz imaging can be used to evaluate the materials and identify internal impurities and thickness. In this study, we propose a terahertz real time imaging method for fast and precise inspection of composite materials. Our terahertz imaging technology analyzes 2D and 3D images of different composite materials to check for defects and impurities. This system is developed for quickly identifying thicknesses, features, and flaws in composite materials used in industrial semiconductor and battery mass production processes. Based on high reliability, this study is anticipated to significantly improve the performance of terahertz non-destructive inspection technology.