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Study on the Non-Contact Sheet Resistance Measuring of Silver Nanowire Coated Film Using Terahertz Wave

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Abstract : In this work, non-destructive evaluation was conducted to measure the sheet resistance of silver nanowire coated film and find a damage of that film using terahertz (THz) wave. Pulse type THz instrument was used, and the measurement was performed under transmission and pitch-catch reflection modes with 30 degree of incidence angle. In the transmission mode, the intensity of the THz wave was gradually increased as the conductivity decreased. Meanwhile, the intensity of THz wave was decreased as the conductivity decreased in the pitch-catch reflection mode. To confirm the conductivity of the film, sheet resistance was measured by 4-point probe station. Interaction formula was drawn from a relation between the intensity and the sheet resistance. Through substituting sheet resistance to the formula and comparing the resultant value with measured maximum THz wave intensity, measurement of sheet resistance using THz wave was more suitable than that using 4-point probe station. In addition, the damage on the silver nanowire coated film was detected by applying the THz image system. Therefore, the reliability of the entire film can be also be ensured. In conclusion, real-time monitoring using the THz wave can be applied in the transparent electrodes with detecting the damaged area as well as measuring the sheet resistance.

Keywords : terahertz wave, sheet resistance, non-destructive evaluation, silver nanowire
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