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**Title: Defect detection technology for optical transparent metallic mesh thin films**

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Cracks and increase in sheet resistance harm the electromagnetic shielding effectiveness (SE) of metallic mesh films. It is necessary to find a easy way to detect these defects. By modeling the metallic mesh as a two-port network, the relationship between the transmittance and complex reflection coefficient was established to evaluate SE through vector reflection measurement. By introducing the time domain gating technique to eliminate interference from the multipath effect, a test deviation of no more than 0.95 dB @ Ku-band compared to the standard SE measurement was observed in a non-anechoic environment, which demonstrates the validity of the proposed method. Moreover, a complementary spiral resonator (CSR) operating at 7.05 GHz is developed to distinguish two typical defects by a downshift in resonant frequency and decrease in quality factor respectively. The CSR was then integrated into a feedback oscillator with an additional loop filter to achieve self-sustained measurement and self-switching effect for crack. The experimental results show that the developed sensor can detect cracks with 0.4 mm width and a 3.6 % increase in sheet resistance.