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Development of a neural network based algorithm for multi-scale roughness parameters of In6S7 semiconductucting compound. RAOUF BENNACEUR, LPMC, LILIA BENNACEUR FARAH, LTSIRS, IMED RIADH FARAH, RIADI, HOUDA BEN ABDALLAH, LPMC — The overall objective of this paper is to retrieve In6S7 semiconducting roughness surfaces parameters by inverting the backscattered EM waves. Because the classical description of roughness using statistical parameters like the correlation length doesn't lead to satisfactory results to predict backscattering, we used a multi-scale roughness description using the wavelet transform and the Mallat algorithm. In this description, the surface is considered as a superposition of a finite number of one-dimensional Gaussian processes each having a spatial scale. A second step in this study consisted in adapting a direct model simulating backscattering namely the small perturbation model to this multi-scale surface description. We investigated the impact of this description on backscattering through a sensitivity analysis of backscattering coefficient to the multi-scale roughness parameters. The dielectric constants are obtained from ab initio FPLAPW band structure calculation. To perform the inversion of the small perturbation multi-scale scattering model (MLS SPM) we used a multi-layer neural network architecture trained by back propagation learning rule. The inversion leads to satisfactory results with a relative uncertainty of 8 %.

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