

Automation control system of the alloying process of gallium arsenide layers growth by epitaxial technology

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Abstract

This paper proposes to control the thermal alloying process of GaAs epilayers growth by transport reaction in Ga-AsCl₃-H₂ system. The thermal alloying process is controlled by using the universal two-channel programmable PID-controller TRM151, which permits automatic control of complicated objects with high precision. The thermal process was identified using the parametric model ARX (Auto-Regressive eXogenous) from System Identification Toolbox from MATLAB. The experimental technologist's program contains steps of p + -p o -n + photovoltaic structures achievement with damper layer on p-GaAs substrate. There is a possibility to obtain multiple periodical epitaxial layers structures with different dimensions and electro-physical properties, including nano-dimension structures, changing different steps of production. The tuning controller was performed using the maximal stability degree method. This control system minimizes the new technologies elaboration terms, accelerates the implementation of the elaborated technology in industry by reducing production costs, improving the product quality and its market competitiveness.