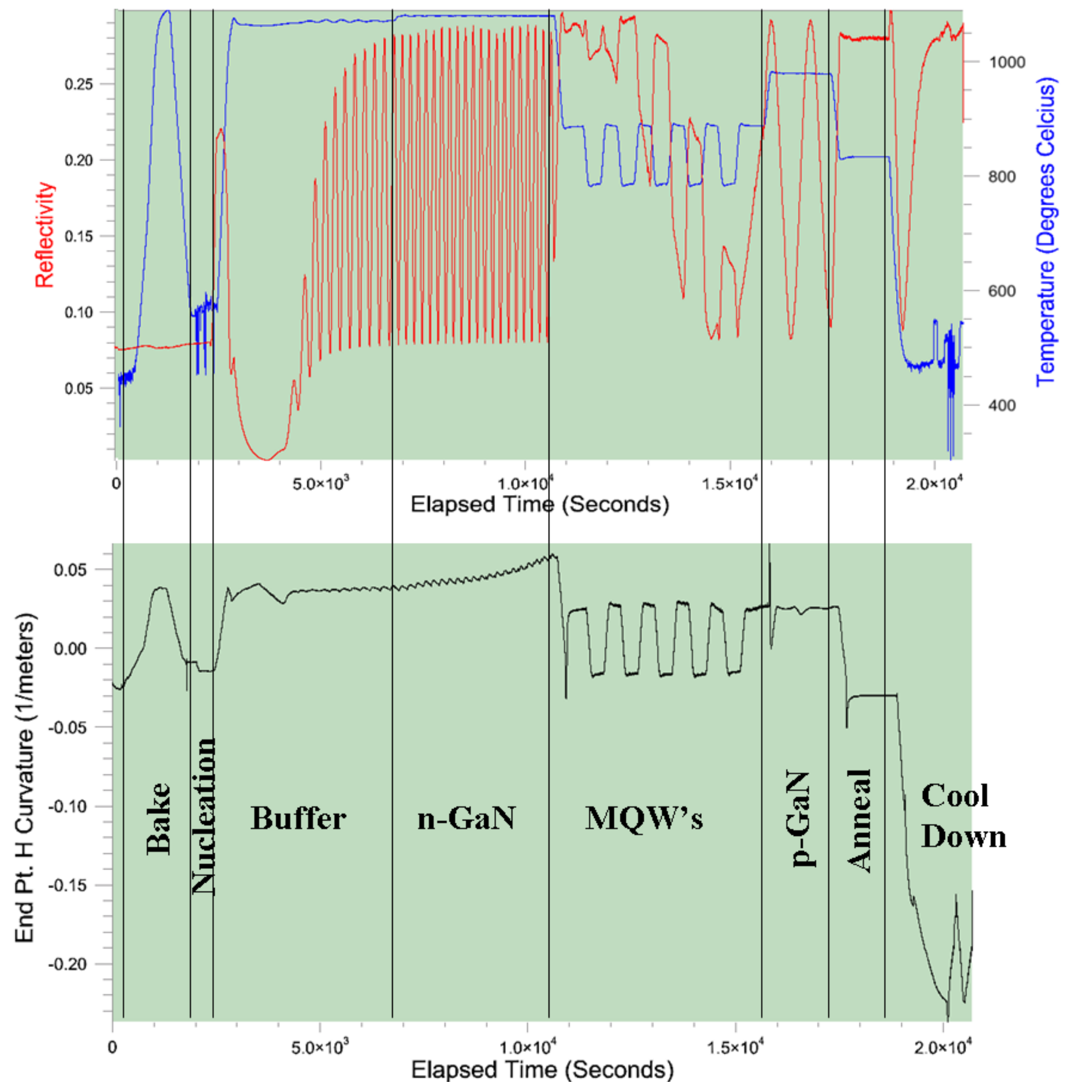
k-Space Associates, Inc.

kSA RateRat Pro

Examples of Real-Time Growth Rate Analysis

The kSA RateRat Pro metrology tool analyzes the reflected laser signal in real-time to determine the deposition rate and optical constants of the growing film. By using a patented Virtual Interface model, the complexity of the underlying layers does not affect the modeling of the current growth layer. Below we show some examples of real-time acquisition and analysis using the RateRat Pro tool.

In the example shown at right, data was taken with a kSA RateRat Pro system on a Thomas Swan Close-Coupled Showerhead (CCS) MOCVD reactor. A standard Blue LED device was grown on SSP sapphire. The oscillations in reflectivity were used to monitor and adjust the deposition rate in real-time. This system was also equipped with kSA MOS curvature and kSA BandiT blackbody temperature measurement capability. Hence all three parameters – reflectivity/growth rate, pocket temperature, and wafer curvature were monitored simultaneously. These capabilities have recently been combined into one system, the kSA ICE metrology tool.



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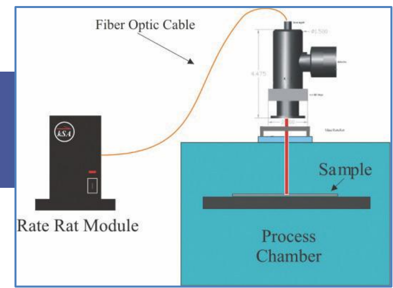

Below we show kSA RateRat Pro data taken during DBR (Double Bragg Reflector) device deposition on a Veeco Gen III MBE reactor. Every layer was fit in real-time to determine growth rate and optical constants, and optional RateRat Pro recipe control was implemented to close the source shutters when the desired layer thickness was shut, guaranteeing proper DBR layer thickness for every individual layer. Notice the real-time display of the growth rate, n, and k, along with error estimates for all 3 parameters.

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