CLAIMS

1. A monitoring and deposition control system comprising: a deposition chamber designed to deposit a stack of material layers on a substrate; a sensor array designed to continuously monitor deposition of each material layer for changes in a layer thickness of each material layer during deposition; and a processing unit designed to receive a determination of a change in thickness and adjust deposition parameters based on the changes in the layer thickness of each material layer during deposition.

2. The system as claimed in claim 1, wherein: the sensor array is designed to detect an error in each material layer; and the processing unit is designed to generate an alert based on the error in each material layer.

3. The system as claimed in claim 1, wherein the sensor array includes: a light source that generates a light output aimed at each material layer; and a spectrometer designed to collect the light output as reflected light off of each material layer and the processing unit determines a spectrum of the reflected light to determine properties of each material layer.

4. The system as claimed in claim 1, wherein the sensor array includes: a light source designed to generate a light output aimed at each material layer; a spectrometer designed to collect the light output as reflected light off of each material layer and the processing unit determines a spectrum of the reflected light for determining properties of each material layer; and wherein the processing unit is designed to normalize the spectrum of the reflected light to a wavelength average of the spectrum of the reflected light.

5. The system as claimed in claim 1, wherein the sensor array includes: a reference fiber; a light source to generate a light output aimed at each material layer and the reference fiber; a spectrometer to collect the light output from the reference fiber and as reflected light off of each material layer, wherein the processing unit is designed to determine a spectrum of the reflected light and the light output from the reference fiber and normalize the spectrum of the reflected light to the light output from the reference fiber and to a wavelength average of the spectrum of the reflected light.

6. The system as claimed in claim 1, further comprising: a chuck within the deposition chamber to position the substrate; and a reference sample having a known spectral response on the chuck used to calibrate the sensor array before depositing the stack of material layers.

7. The system as claimed in claim 4, further comprising: a chuck within the deposition chamber to position the substrate; a tilt compensation system having a tilt sensor designed to determine the substrate and each material layer are tilted relative to a horizontal position; and wherein the tilt compensation system is designed to adjust the tilt of the substrate and each material layer using a mechanism in the chuck.

8. The system as claimed in claim 5, wherein the monitoring and deposition control system are designed to use the spectrum of the reflected light as collected by the spectrometer to determine a layer thickness error lower than 0.1 Angstroms.

9. The system as claimed in claim 5, wherein the monitoring and deposition control system utilizes wavelengths ranging from 200 nm to 800 nm.

10. The system as claimed in claim 9, wherein the monitoring and deposition system is designed to perform a layer-by-layer scan of the stack of material layers and record a spectral signature for each material layer.

11. The system as claimed in claim 10, wherein the monitoring and deposition system is designed to detect a layer thickness error in alternating material layers of Mo and Si.

12. The system as claimed in claim 11, wherein the monitoring and deposition control system are designed to use the spectrum of the reflected light as collected by the spectrometer to determine a layer thickness error lower than 0.1 Angstroms.