CLAIMS

1. A method for inspecting semiconductor samples, comprising:
on an inspection tool, selecting a plurality of different wavelength ranges for different layers of interest of one or more semiconductor samples based on whether such different layers of interest have an absorber type material present within or near such different layers of interest;
on the inspection tool, directing at least one incident beam at the different wavelength ranges towards the different layers of interest and, in response, obtaining a plurality of output signals or images for each of the different layers of interest; and
analyzing the output signals or images from each of the different layers of interest to detect defects in such different layers of interest wherein the absorber type material is SiN; and

wherein selecting the different wavelength ranges comprises:
selecting a shorter wavelength range that is below an absorption edge wavelength of SiN for a first one of the different layers of interest that does not have SiN present within or near such first layer of interest or has SiN present below such first layer of interest; and
selecting a longer wavelength range that is above the absorption edge wavelength for a second one of the different layers of interest that has SiN present above such second layer of interest.

2. The method of claim 1, wherein selecting the different wavelength ranges further comprises:
selecting a narrow and shorter wavelength range at a third one of the different layers of interest that has SiN present within such third layer of interest.

3. The method of claim 2, wherein:
the shorter wavelength range is 220 nm or less;
the longer wavelength range is 230 nm or more; and
the narrow and shorter wavelength range is between about 230 nm and 250 nm.

4. The method of claim 2, wherein selecting the different wavelength ranges includes determining whether there is SiN present within or near each of the different layers of interest

as specified in a design database with which the sample was fabricated.

5. The method of claim 2, wherein selecting the different wavelength ranges includes determining whether there is SiN present within or near each of the different layers of interest as specified with a list of layers and material type without provision of a design database with which the sample was fabricated.

6. The method of claim 2, further comprising applying a horizontal or vertical polarization to the at least one incident beam.

7. The method of claim 2, further comprising selecting different aperture settings for the at least one incident beam to achieve a particular angle of incidence for at least some of the different layers of interest.

8. The method of claim 1, wherein at least some of the different wavelength ranges for a particular layer of interest having a vertical stack structure include a longer wavelength range to detect defects on both a surface and throughout a depth of the vertical stack structure and a shorter wavelength range to detect defects on the surface of the vertical stack structure.

9. An inspection system for inspecting a semiconductor sample, comprising:
an illumination optics module for generating and directing an incident beam towards one or more semiconductor sample at a plurality of different wavelength ranges for different layers of interest based on whether such different layers of interest have an absorber type material present within or near a layer of interest at such different layers of interest;
a collection optics module for collecting an output beam that is reflected or scattered from the different layers of interest in response to the incident beam; and
a controller that is configured to perform the following operations:
selecting a plurality of different wavelength ranges for different layers of interest of one or more semiconductor samples based on whether such different layers of interest have an absorber type material present within or near such different layers of interest;
causing at least one incident beam to be directed at the different wavelength ranges towards the different layers of interest and, in response, obtaining a plurality of output signals or images for each of the different layers of interest; and
analyzing the output signals or images from each of the different layers of interest to detect

defects in such different layers of interest, wherein the absorber type material is SiN; and

and wherein selecting the different wavelength ranges comprises:
selecting a shorter wavelength range that is below an absorption edge wavelength of SiN for a first one of the different layers of interest that does not have SiN present within or near such first layer of interest or has SiN present below such first layer of interest; and
selecting a longer wavelength range that is above the absorption edge wavelength for a second one of the different layers of interest that has SiN present above such second layer of interest.

10. The system of claim 9, wherein selecting the different wavelength ranges further comprises:
selecting a narrow and shorter wavelength range at each of a third set of the different layers of interest that has SiN present within such third layer of interest.

11. The system of claim 10, wherein:
the shorter wavelength range is 220 nm or less;
the longer wavelength range is 230 nm or more; and
the narrow and shorter wavelength range is between about 230 nm and 250 nm.

12. The system of claim 10, wherein selecting the different wavelength ranges includes determining whether there is SiN present within or near each of the different layers of interest as specified in a design database with which the sample was fabricated.

13. The system of claim 10, wherein selecting the different wavelength ranges includes determining whether there is SiN present within or near each of the different layers of interest as specified with a list of layers and material type without provision of a design database with which the sample was fabricated.
14. The system of claim 10, wherein the controller is further configured for applying a horizontal or vertical polarization to the at least one incident beam.

15. The system of claim 10, wherein the controller is further configured for selecting different aperture settings for the at least one incident beam to achieve a particular angle of incidence

for at least some of the different layers of interest.

16. The system of claim 9, wherein at least some of the different wavelength ranges for a particular layer of interest having a vertical stack structure include a longer wavelength range to detect defects on both a surface and throughout a depth of the vertical stack structure and a shorter wavelength range to detect defects on the surface of the vertical stack structure.