

What is claimed is:

1. A system for measuring one or more properties of a photoresist ~~photosensitive~~ material, comprising:

a photolithography processing system adapted to perform a defined photolithography process on the photoresist ~~photosensitive~~ material; and

a coherent anti-Stokes Raman scattering (CARS) microscopy system adapted to perform a measurement of the one or more properties of the photoresist ~~photosensitive~~ material.

2. The system of claim 1, wherein the CARS microscopy system is adapted to perform the measurement of the one or more properties of the photoresist ~~photosensitive~~ material simultaneous with the photolithography processing system performing the defined photolithography process on the photoresist ~~photosensitive~~ material.

3. The system of claim 1, wherein the photolithography processing system is adapted to pause the defined photolithography process being performed on the photoresist ~~photosensitive~~ material, and wherein the CARS microscopy system is adapted to perform the measurement of the one or more properties of the photoresist ~~photosensitive~~ material while the photolithography processing system has paused the defined photolithography process performed on the photoresist ~~photosensitive~~ material.

4. The system of claim 1, further comprising a scanning mechanism adapted to subject distinct portions of the photoresist ~~photosensitive~~ material to the measurement performed by the CARS microscopy system.

5. The system of claim 4, wherein the CARS system is adapted to generate an incident radiation beam directed at the photoresist material, and wherein the scanning mechanism is adapted to move a stage that supports the photoresist photosensitive material so that the incident radiation beam interacts with different portions of the photoresist material.

6. The system of claim 4, wherein the CARS system is adapted to generate an incident radiation beam directed at the photoresist ~~photosensitive~~ material, and wherein the scanning mechanism is adapted to steer the incident radiation beam.

7. The system of claim 4, wherein the CARS system comprises:
a Stokes beam source adapted to generate a Stokes radiation beam directed at the specimen; and
a pump beam source adapted to generate a pump radiation beam directed at the specimen;
wherein the scanning mechanism is adapted to steer the Stokes and pump radiation beams.

8. The system of claim 1, wherein the CARS microscopy system comprises:
a Stokes beam source adapted to generate a Stokes radiation beam with a frequency ω_s ; and
a pump beam source adapted to generate a pump radiation beam with a frequency ω_p .

9. The system of claim 8, wherein the CARS microscopy system is adapted to direct the Stokes radiation beam and the pump radiation beam to substantially the same region of the photoresist ~~photosensitive~~ material.

10. The system of claim 8, wherein the CARS microscopy system is adapted to combine the Stokes radiation beam and the pump radiation beam to generate an incident radiation beam directed at the photoresist ~~photosensitive~~ material, wherein the incident radiation beam has a frequency of $2\omega_P - \omega_S$.

11. The system of claim 1, wherein the CARS microscopy system comprises:

at least one radiation beam source adapted to generate an incident radiation beam upon the photoresist ~~photosensitive~~ material; and

a detector adapted to detect radiation emitted by the photoresist ~~photosensitive~~ material in response to the incident radiation beam.

12. The system of claim 11, wherein the emitted radiation by the photoresist ~~photosensitive~~ material provides information regarding the one or more properties of the photoresist ~~photosensitive~~ material.

13. The system of claim 12, wherein the one or more properties of the photoresist ~~photosensitive~~ material comprises a degree of cross-linking of polymers in the photoresist ~~photosensitive~~ material.

14. The system of claim 12, wherein the one or more properties of the photoresist ~~photosensitive~~ comprises a degree of polymer weakening or scission in the photoresist ~~photosensitive~~ material.

15. The system of claim 1, wherein the photoresist ~~photosensitive~~ material comprises a positive photoresist.

16. The system of claim 1 ~~15~~, wherein the photoresist material comprises a negative photoresist.

17. A method of measuring one or more properties of a photoresist ~~photosensitive~~ material while undergoing a defined photolithography process, comprising:

performing the defined photolithography process on the photoresist ~~photosensitive~~ material; and

measuring the one or more properties of the photoresist ~~photosensitive~~ material using coherent anti-Stokes Raman scattering (CARS) microscopy.

18. The method of claim 17, wherein measuring the one or more properties of the photoresist ~~photosensitive~~ material comprises measuring the one or more properties of the photoresist ~~photosensitive~~ material simultaneously with the defined photolithography process being performed on the photoresist ~~photosensitive~~ material.

19. The method of claim 17, further comprising pausing the defined photolithography process performed on the photoresist ~~photosensitive~~ material, wherein measuring the one or more properties of the photoresist ~~photosensitive~~ material is performed while the defined photolithography process on the photoresist ~~photosensitive~~ material is paused.

20. A system for measuring one or more properties of a photoresist ~~photosensitive~~ material while the photoresist ~~photosensitive~~ material is being manufactured, comprising:

a photoresist ~~photosensitive~~ material manufacturing system adapted to manufacture the photoresist ~~photosensitive~~ material; and

a coherent anti-Stokes Raman scattering (CARS) microscopy system adapted to perform a measurement of the one or more properties of the photoresist ~~photosensitive~~ material while the photoresist ~~photosensitive~~ material is being manufactured by the photoresist ~~photosensitive~~ material manufacturing system.

21. The system of claim 1, wherein the CARS system is configured to generate a first radiation beam directed at the photoresist material, wherein the photolithography processing system is configured to generate a second radiation beam directed at the photoresist material, and wherein the second radiation beam is derived from the first radiation beam.