Claims

1. A method for depositing a layer on a substrate, comprising:

flowing a fluid precursor radially across a surface of the substrate disposed within a processing chamber in a laminar manner so that the surface of the substrate is immersed in the fluid precursor;

directing an electromagnetic radiation generated from a radiation source to a rotary scanning unit such that the electromagnetic radiation is deflected and scanned, in a predetermined shape of illumination, across the substrate at or near the surface upon which a material layer is to be deposited; and

initiating an epitaxial process with the electromagnetic radiation having a wavelength selected for photolytic dissociation of the fluid precursor by irradiating the fluid precursor at or near the surface of the substrate to epitaxially form the material layer onto the surface of the substrate at a temperature less than about 400°C.

2. The method of claim 1, wherein the radiation source comprises a laser source, a bright light emitting diode (LED) source, or a thermal source.

3. The method of claim 1, wherein the electromagnetic radiation is a pulsed laser beam, a continuous wave (CW) laser beam, or a quasi-CW laser beam.

4. The method of claim 1, wherein the electromagnetic radiation is delivered in a pulsed mode with a pulse duration of about 0.01 microsecond (μsec) to about 100 millisecond (msec) and an energy density ranging from 0.1 J/cm^2 to about 1.0 J/cm^2.