

## **SYSTEMS AND METHODS FOR FORMING SEMICONDUCTOR MATERIALS BY ATOMIC LAYER DEPOSITION**

### **ABSTRACT**

Methods of depositing a III-V semiconductor material on a substrate include sequentially introducing a gaseous precursor of a group III element and a gaseous precursor of a group V element to the substrate by altering spatial positioning of the substrate with respect to a plurality of gas columns. For example, the substrate may be moved relative to a plurality of substantially aligned gas columns, each disposing a different precursor. Thermalizing gas injectors for generating the precursors may include an inlet, a thermalizing conduit, a liquid container configured to hold a liquid reagent therein, and an outlet. Deposition systems for forming one or more III-V semiconductor materials on a surface of the substrate may include one or more such thermalizing gas injectors configured to direct the precursor to the substrate via the plurality of gas columns.

Fig. 1