

# DLI-CVD & DLI-ALD

Direct Liquid Injection Chemical Vapor Deposition  
Direct Liquid Injection Atomic Layer Deposition

**The most efficient technology  
for the deposition of new materials**

## DLI-CVD / DLI-ALD Processes

Key technology for the following materials

- Simple and multi-metallic oxides
- 2D materials
- Nitrides, metals, and alloys
- Etc.

## DLI-CVD / DLI-ALD Applications

Optical waveguides, Optical coating,  
MIMS capacitors, microwave integrated circuit,  
Superconductors, ferroelectric memories ,  
Bioactive and biocompatible coatings,  
Thermal and anticorrosion barriers,  
Micro batteries



# CVD versus ALD

## DLI-CVD

- High growth rates
- Thickness: tens of nm up to several microns
- Temperature: 350°C to 800°C
- Capability to deposit multi metallic oxides
- Excellent control of the stoichiometry
- Possibility to deposit crystalized layer
- Limitation for high aspect ratio
- Possibility to grow epitaxial layers

## DLI-ALD

- Low growth rates
- Thickness from few nm up to 50 nm
- Low temperature processes 80°C to 350°C
- Difficult to deposit multi-material layers
- Difficult control of the stoichiometry
- Typically amorphous layers
- Very conformal

## DLI-CVD / DLI-ALD Processes

### Examples of deposited materials

**Oxides:** BaO, Y<sub>2</sub>O<sub>3</sub>, Cr<sub>2</sub>O<sub>3</sub>, TiO<sub>2</sub>, Al<sub>2</sub>O<sub>3</sub>, HfO<sub>2</sub>, Li<sub>2</sub>O, SiO<sub>2</sub>, LIPON, Bi<sub>2</sub>O<sub>3</sub>, Co<sub>3</sub>O<sub>4</sub>, CuCrO<sub>2</sub>, SiO<sub>2</sub>, LiNbO<sub>3</sub>, LaNiO<sub>3</sub>, SiZrO<sub>x</sub>, SrTiO<sub>3</sub>, BaTiO<sub>3</sub>, Mo<sub>v</sub>Cr<sub>w</sub>Fe<sub>x</sub>Bi<sub>y</sub>O<sub>z</sub>

**2D materials:** Graphene, h-BN, TMDs (MoS<sub>2</sub>, WS<sub>2</sub>, etc.)

**Nitrides:** TiN, AlN

**Metals:** Pt, Mo, W, Ru ....

**Ask for our application notes**

## MC-050

**All in one**

Multi-process 2-inch DLI system

DLI-CVD, DLI-ALD, MOCVD, RTP, RTCVD



## MC-100

**Easy multi process capabilities**

100 mm (4-inch) DLI reactor for R&D

DLI-CVD, DLI-ALD, Pulse Pressure CVD

## DLI systems

- Multi process capability reactors: CVD, ALD, MOCVD, pulse pressure CVD, RTP...
- Low cost of ownership, low maintenance cost
- Optimizes integration of DLI vaporizers
- State of the art liquid panels

## MC-200

**Climb to the 200 mm step**

200 mm DLI reactor

DLI-CVD, DLI-ALD, Pulse Pressure CVD





## Annealsys proposes RTP and DLI-CVD process service



**We have capability to perform many processes in our laboratory.**

**If you need to anneal layers or to deposit oxides, metals or nitrides, feel free to contact us for a proposal.**

# Thank you for your attention



**ANNEALSYS**  
IN SEARCH OF EXCELLENCE

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