Hot-Wire Enhanced Atomic Layer Deposition

Principles and Equipment

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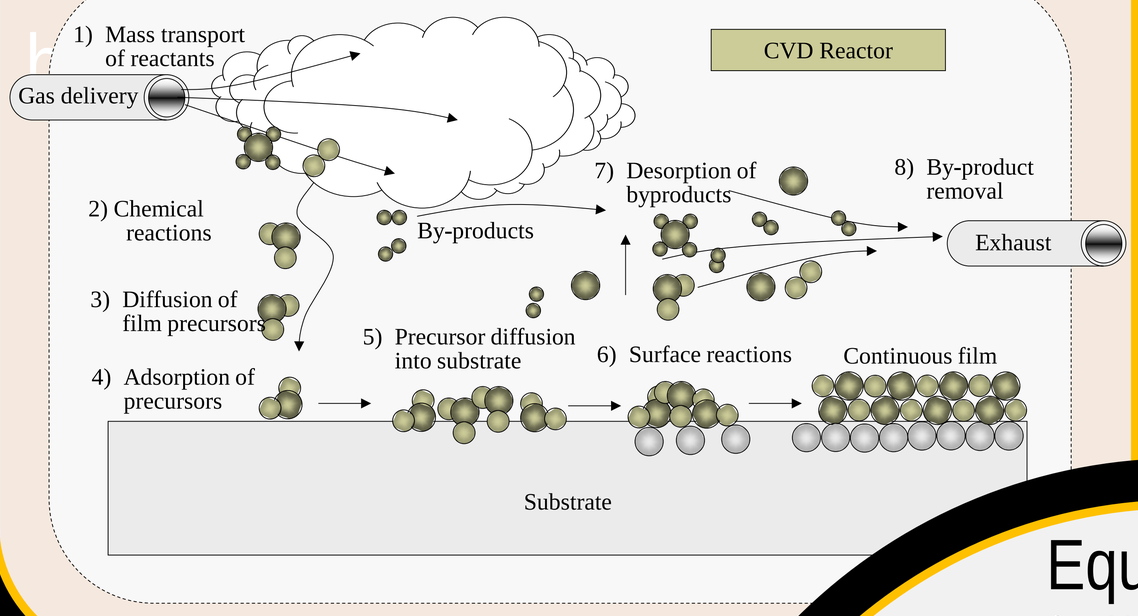
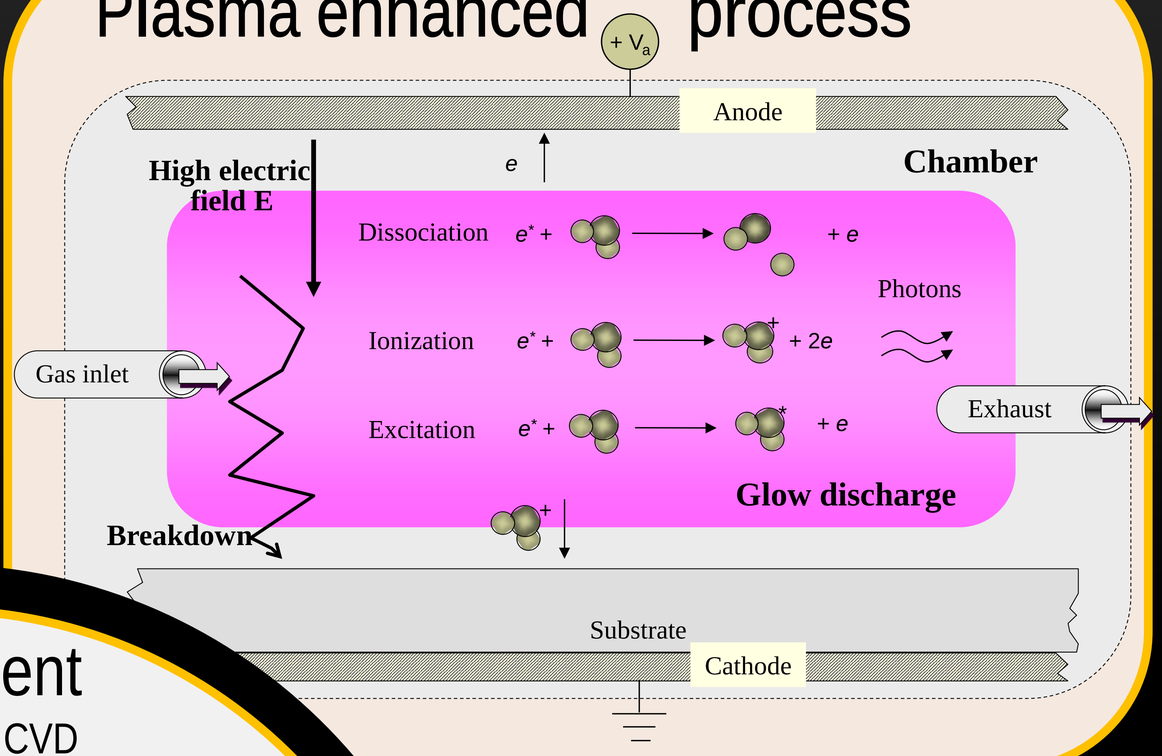
Purely thermal process

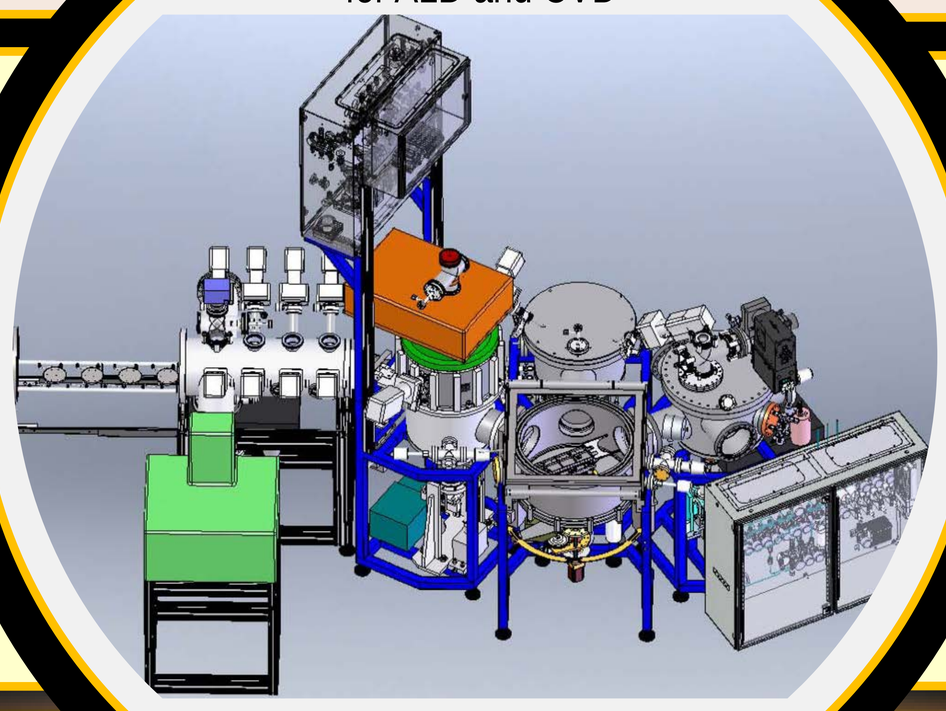


Plasma enhanced process



Equipment

for ALD and CVD



Cluster Tool

home built

ALD with plasma

1. Breaking molecules by electrons or excited species

2.. Difficult at low gas pressure

3. Many chemical reactions

4. More reactions & charging due to ions

5. UV light

ALD with hot wire

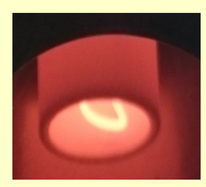
1. Catalytic dissociation by a hot (1600-2000 °C) tungsten wire

2.. Lower pressures possible

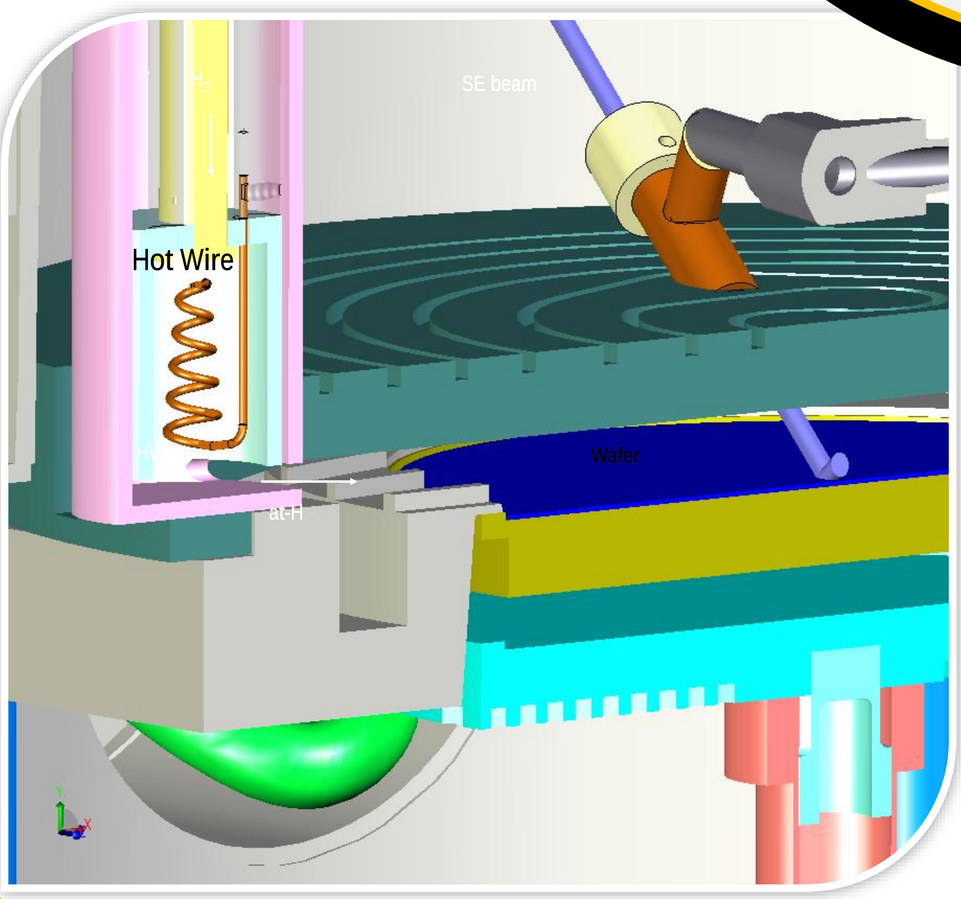
3. Number of reactions is limited

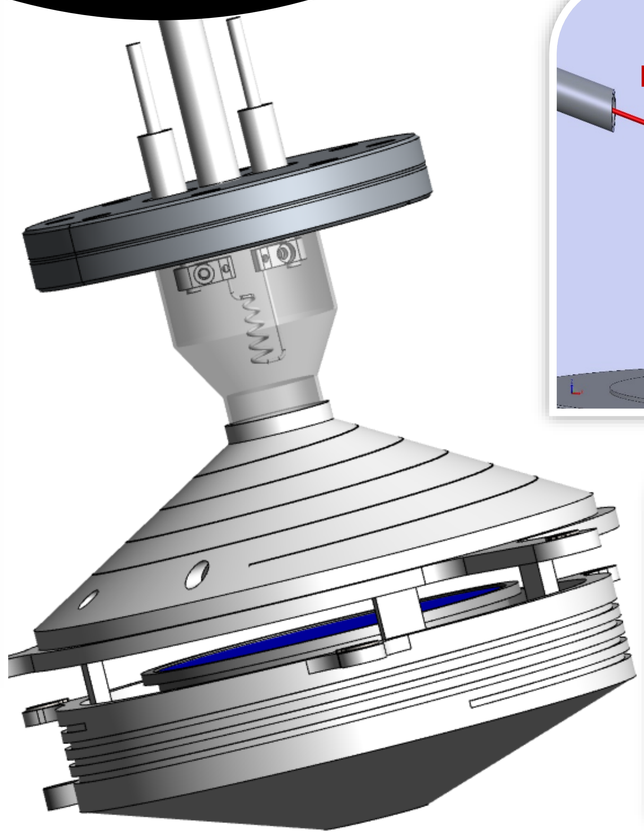
4. No ions

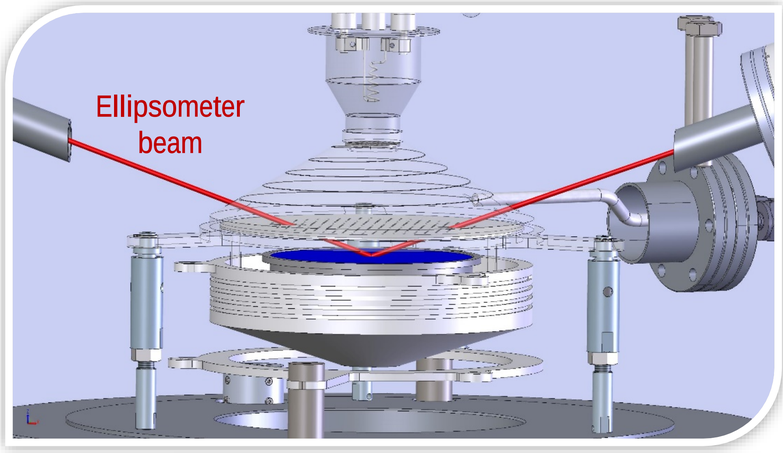
5. No UV light



Home-built reactors

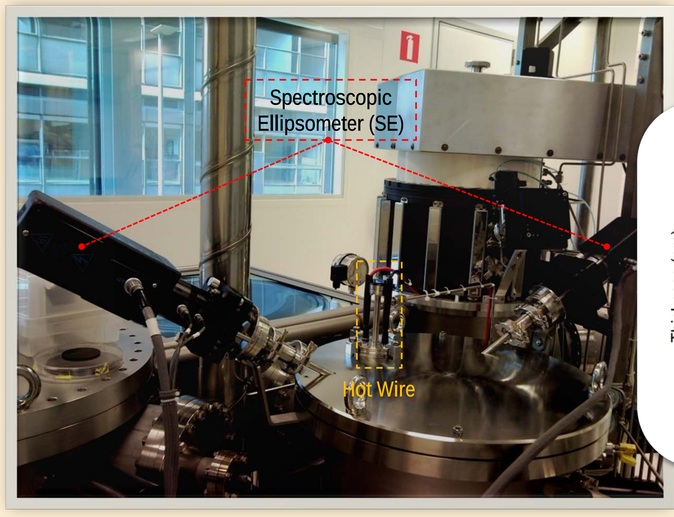




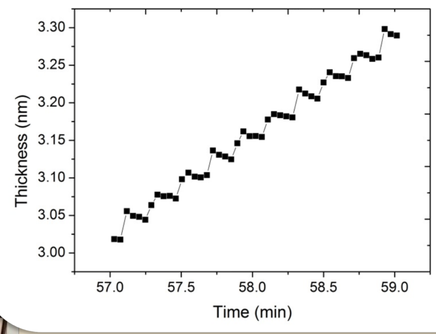


for hot-wire enhanced ALD

In-situ process monitoring

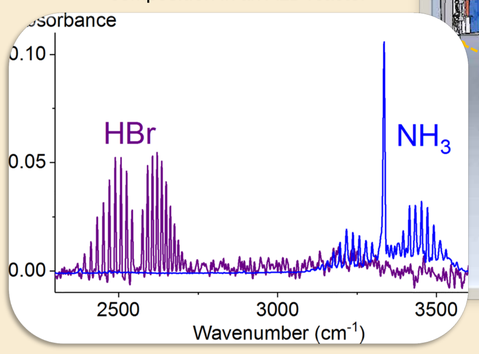


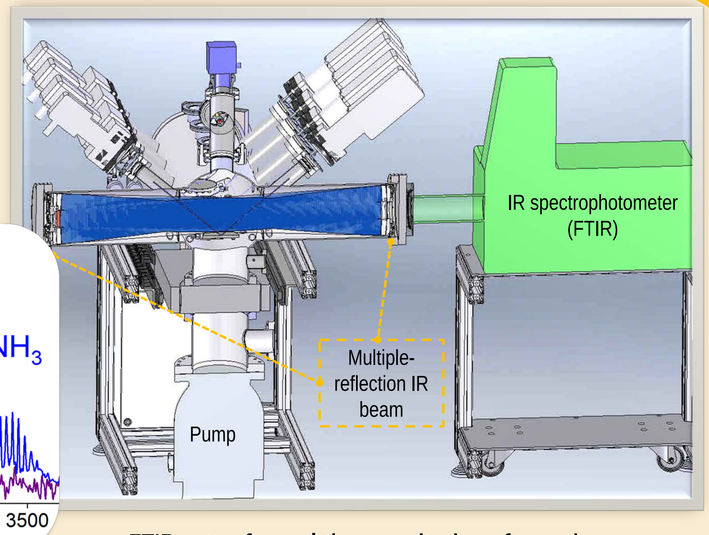
ALD reactor equipped with Hot Wire and in situ SE



Individual ALD steps and total thickness evolution by in situ SE

FTIR analysis of gas-phase composition in an ALD reactor





FTIR setup for real-time monitoring of gas-phase