Atomic Layer Deposition:
ALD 101

The Chip History Center
Preserving the History of Semiconductors for Future Generations
Did you know that chip makers routinely make films one atom at a time?
Those atoms are better organized than these tulips.
It’s called: Atomic Layer Deposition or ALD

- It’s much finer than either . . .
  - Chemical Vapor Deposition (CVD)
  - Physical Vapor Deposition (PVD)
CVD and PVD throw down molecules haphazardly.
ALD uses the natural bonds on the base layer to self-assemble.
Bonds in molecule ‘A’ hook up with those on the green base layer.
The bonds are like parking spaces for the A atoms, filling up with more molecules.
The A atoms also have bonds for the yellow ‘B’ atoms.
The atoms will not adhere . . .
Unless they can find a bond.
As more atoms flow over the surface of the A atoms . . .
The A level parking lot is filled up with B atoms.
Then it starts all over again.
The A atoms are now linking to the open bonds on the B atom layer.
Soon the B level is filled up with A atoms

*It won’t stop until the lot is saturated!*
But the atoms will only stick where there are open bonds,
making for perfectly uniform layers a single atom thick.
You can continue until the perfect film is made to your exact specifications.
And that's ALD!
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With many thanks for the support and encouragement of
Aviza Technology
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