Atomic Layer Deposition: ALD 101



The Chip History Center

Preserving the History of Semiconductors for Future Generations

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Did you know that chip makers routinely make films one atom at a time?







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Those atoms are better organized than these tulips.









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It's called: Atomic Layer Deposition or ALD

It's much finer than either . . .
—Chemical Vapor Deposition (CVD)
—or Physical Vapor Deposition (PVD)

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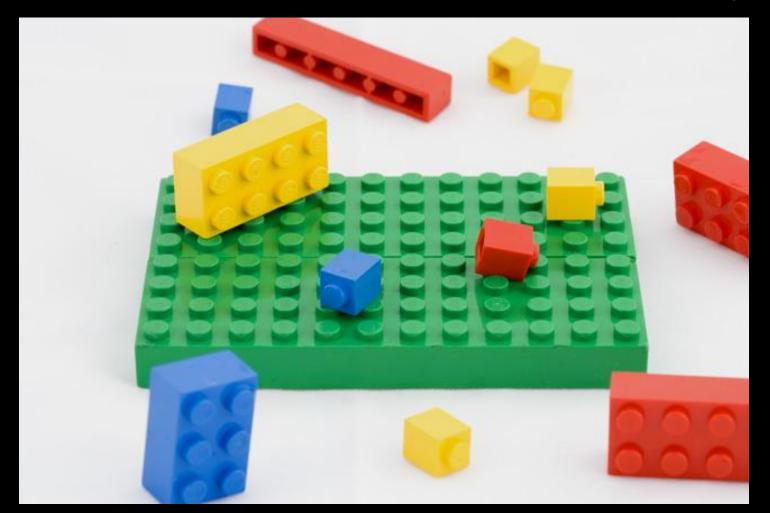
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CVD and PVD throw down molecules haphazardly.



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ALD uses the natural bonds on the base layer to self-assemble.



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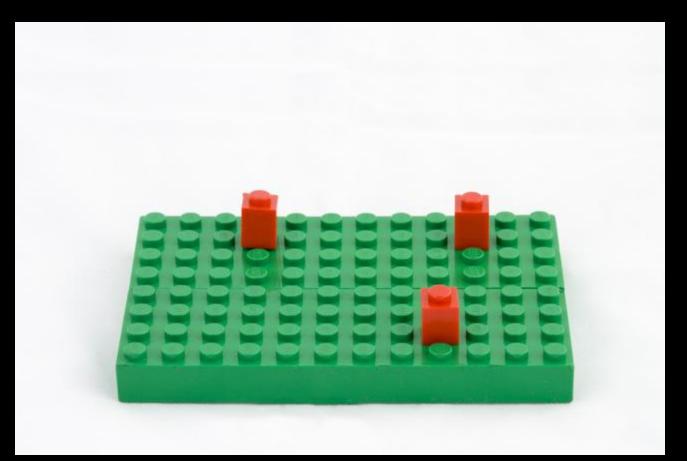
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Bonds in molecule 'A' hook up with those on the green base layer.



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The bonds are like parking spaces for the A atoms, filling up with more molecules.



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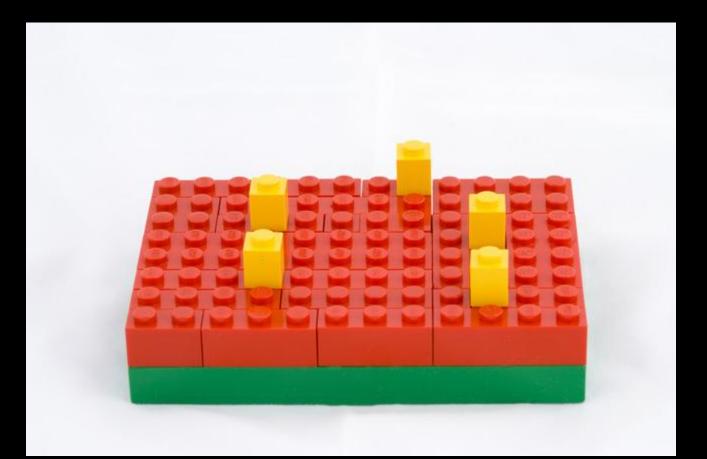
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The A atoms also have bonds for the yellow 'B' atoms.



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The atoms will not adhere . . .



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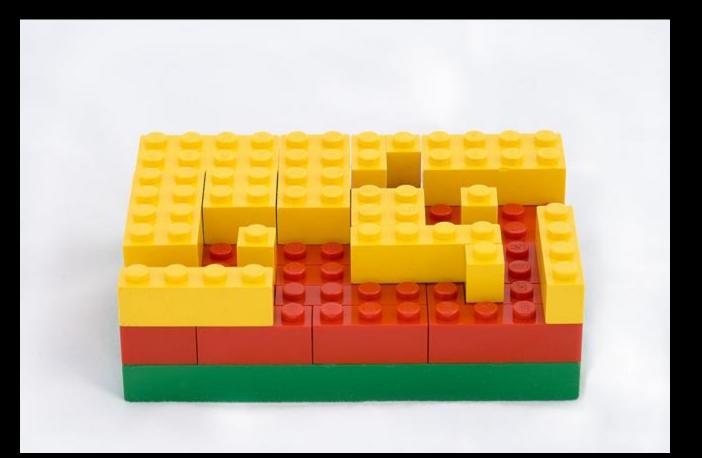
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Unless they can find a bond.



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As more atoms flow over the surface of the A atoms . . .



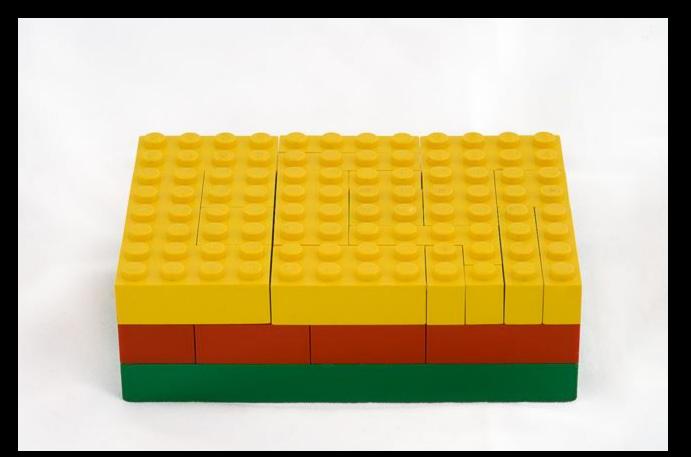
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The A level parking lot is filled up with B atoms.



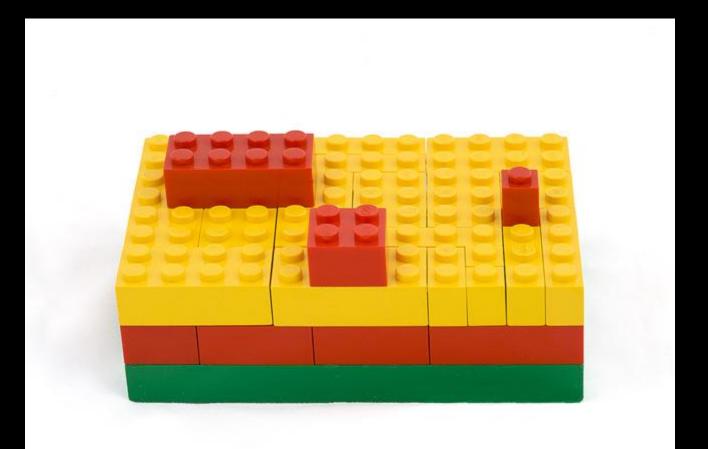
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Then it starts all over again.



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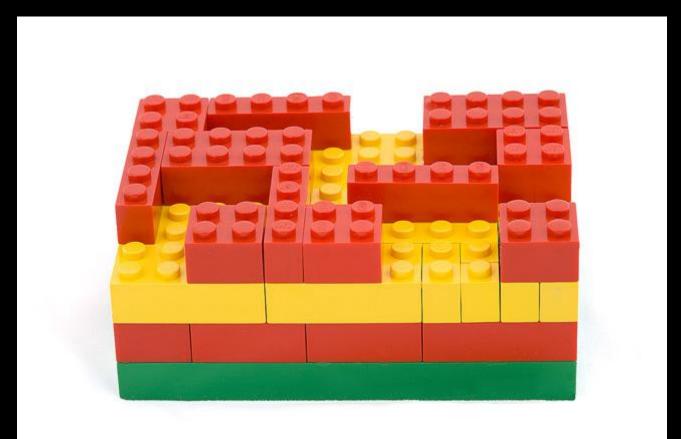
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The A atoms are now linking to the open bonds on the B atom layer.



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Soon the B level is filled up with A atoms It won't stop until the lot is saturated!



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But the atoms will only stick were there are open bonds,



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making for perfectly uniform layers a single atom thick.



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You can continue until the perfect film is made to your exact specifications.



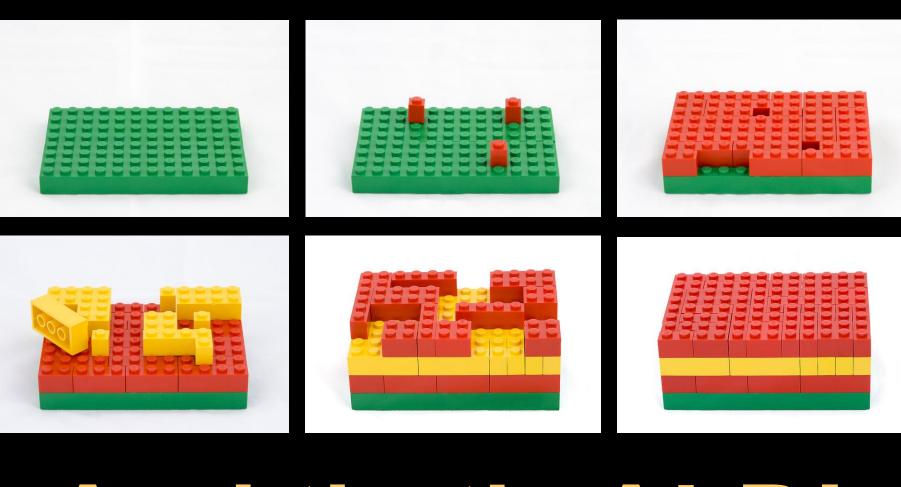
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And that's ALD!







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Photography by Dan Hutcheson

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With many thanks for the support and encouragement of Aviza Technology

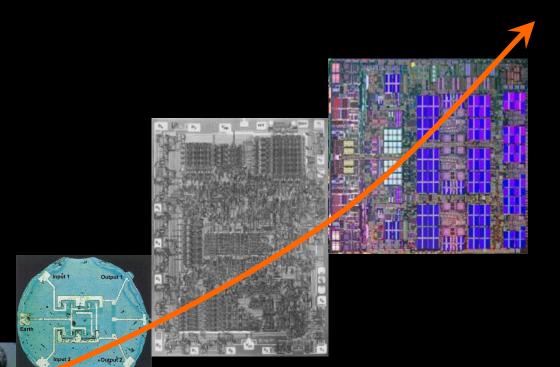


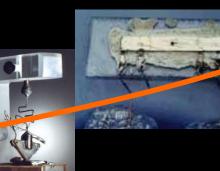




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