

## New Small Molecule Inhibitors for Microchip Fabrication

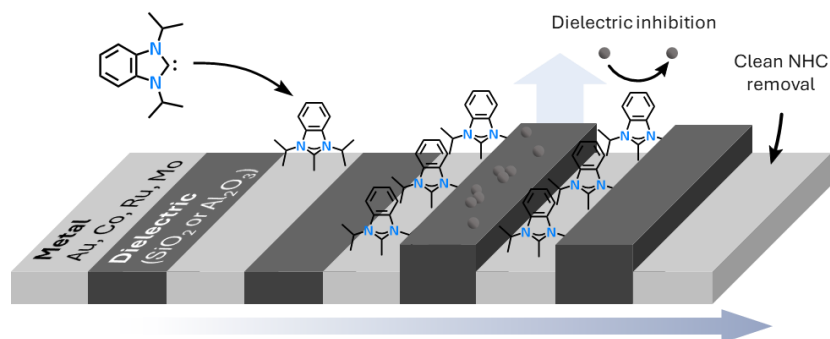
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Integrated circuits (ICs) are used in all modern electronic devices and have made significant impacts to our daily lives. ICs are comprised of a series of interconnected electronic components that are embedded into a single piece of semiconducting material (e.g. SiO<sub>2</sub>).<sup>1</sup> The communication between device components requires the transfer of electrons and is related to the distance they must travel.<sup>2</sup> Therefore, to produce faster devices, interconnects must be as conductive and short as possible. As device features shrink below 10 nm,<sup>1</sup> top-down lithographic processes are prone to defects and quickly reaching the limits of optical resolution.<sup>3</sup> Atomic layer deposition (ALD) is a promising approach to addressing these challenges.

ALD is a bottom-up fabrication method which provides atomic-level control over both the thickness and position of deposited films.<sup>4</sup> The confinement of film growth to specific regions can be achieved through the use of small molecule inhibitors (SMIs). Herein, our journey towards N-heterocyclic carbenes (NHCs) as SMIs will be presented.<sup>5</sup>

### **NHCs as small molecule inhibitors (SMIs)**



### **References**

1. Editorial, *Nat. Electron.* **2018**, 1 (9), 483-483.
2. Rickerby, J.; Steinke, J. H. G., *Chem. Rev.* **2002**, 102 (5), 1525-1550.
3. a) Mackus, A.; Bol, A.; Kessels, W., *Nanoscale* **2014**, 6 (19), 10941-10960; b) Mackus, A. J.; Merckx, M. J.; Kessels, W. M., *Chem. Mater.* **2018**, 31 (1), 2-12.
4. George, S. M., *Chem. Rev.* **2010**, 110 (1), 111-131.
5. Lomax, J. T.; Goodwin, E.; Aloisio, M. D.; Veinot, A. J.; Singh, I.; Shiu, W.-T.; Bakiro, M.; Bentley, J.; DeJesus, J. F.; Gordon, P. G.; Liu, L.; Barry, S.; Crudden, C. M.; Ragogna, P., *Chem. Mater.* **2024**, 36 (11), 5500-5507.