Robust Hydrophobic Coatings Using Nano and Micro-Diamonds

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Executive Statement:

This technology enables the creation of highly hydrophobic surfaces on silicon using a novel layer-by-layer approach with nano and micro-diamond particles.

Technology Overview:

Developed by Matthew R. Linford and Anubhav Diwan at Brigham Young University, this invention employs a unique method of applying hydrophobic coatings on silicon surfaces. By utilizing a combination of polyallylamine (PAAm) and diamond particles, followed by surface reactions with various epoxides, the technology achieves surfaces with remarkable water repellency. The degree of hydrophobicity is measured by the water contact angle (WCA), with the technology capable of producing surfaces that not only are hydrophobic but also exhibit superhydrophobic properties in some cases.

Key Advantages:

- Enhanced durability and robustness of hydrophobic layers
- Utilization of nano and micro-diamond particles to increase surface roughness and hydrophobicity
- Capability to achieve superhydrophobic surfaces with water contact angles above 150°Strong adhesion of the hydrophobic layer to the substrate, mimicking the "Petal effect"

Problems Addressed:

- Creation of durable hydrophobic surfaces that resist wear and degradation
- Improvement of water repellency on silicon surfaces for various applications
- Overcoming the limitations of existing hydrophobic coatings in terms of robustness and longevity

Market Applications:

- Waterproof coatings for electronics and solar panels
- Anti-fouling surfaces for marine and medical equipment
- Self-cleaning surfaces for buildings and vehicles
- Advanced materials for aeronautics and space exploration