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### **Research Summary:**

My research expertise is primarily in the area of synthesis and processing of CVD-diamond thin films and other carbon based materials such as diamond-like carbon and carbon nanotubes/nanofibers. My research interests include nucleation and growth of diamond thin films, surface chemistry of diamond surfaces, micro and nano-scale tribology, MEMS/NEMS fabrication, and field emission. At CNM, my research work is currently focused on the integration of ultrananocrystalline diamond/PZT for the fabrication of piezoacuated resonators and nano-scale switches to develop CMOS compatible diamond based NEMS.

### **Selected Representative Publications:**

1. R. J. Cannara, M. J. Brukman, K. Cimatu, A. V. Sumant, S. Baldelli, R. W. Carpick, "Nanoscale friction varied by isotopic shifting of surface vibrational frequencies," *Science*, 318, 780 (2007).
2. A.V. Sumant, D. S. Grierson, J. E. Gerbi, J. Carlisle, O. Auciello, R. W. Carpick, "The surface chemistry and bonding configuration of ultrananocrystalline diamond surfaces, and their effects on nanotribological properties," *Physical Review B* 76 235429 (2007).
3. A. V. Sumant, D. S. Grierson, A. R. Konicek, M. Abrecht, P.U.P.A. Gilbert, J. E. Butler, T. Feygelson, S. Rotter, R. W. Carpick, "Surface composition, bonding and morphology in the nucleation and growth ultra-thin, high quality nanocrystalline diamond thin films," *Diam. Relat. Mater.* 16, 718 (2007).
4. O. Auciello, S. Pacheco, A. V. Sumant, C. Gudeman, S. Sampath, A. Dutta, R. W. Carpick, V. Adiga, P. Zurcher, Z. Ma, H. Yuan, J. A. Carlisle, B. Kabuis, J. Hiller, S. Srinivasan, "Are diamonds MEMS' best friend?" *IEEE Microwave Mag.* 8(7), 61 (2007).
5. D. S. Grierson, A. V. Sumant, A. R. Konicek, M. Abrecht, J. Birrell, O. Auciello, J. Carlisle, T. Scharf, M. T. Dugger, P.U.P.A. Gilbert, R. W. Carpick, "Tribocchemistry and material transfer for the Ultrananocrystalline diamond-silicon nitride interface by X-PEEM spectromicroscopy," *J. Vac. Sci. Technol. B* 25(5), 1700 (2007).
6. H. Y. Yap, B. Ramaker, A. V. Sumant and R. W. Carpick, "Growth of mechanically fixed and isolated vertically-aligned carbon nanotubes and nanofibers for nanomechanical testing by DC-Plasma enhanced hot filament chemical vapor deposition system," *Diam. Relat. Mater.* 15, 1622 (2006).
7. A.V. Sumant, D. S. Grierson, J. E. Gerbi, J. Birrell, U. D. Lanke, O. Auciello, J. A. Carlisle, and R. W. Carpick, "Towards the ultimate tribological interface: Surface chemistry and nanotribology of ultrananocrystalline diamond," *Adv. Mater.* 17, 1039 (2005).