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Research Summary:

- **Development of high resolution, high aspect ratio lithographic processes**
- **Development of etching and growth processes for advanced micro- and nano-devices**
- **Characterizing chemical and lithographic properties of materials**
- **Synthesis of nanoparticles and their use in micro-/nanodevices**
- **Characterizing interfacial and compatibility properties of materials used in MEMS and NEMS**
- **Development of membrane-based devices**

Selected recent publications:

1. Wang, Y-Lei., Ma, X., Xu, J., Xiao, Z-Li., Snezhko, A., Divan, R., Ocola, L.E., Pearson, J.E., Janko, B., Kwok, W.-K. "Switchable geometric frustration in an artificial-spin-ice–superconductor heterosystem, *Nature Nanotechnology*", 2018 13(7), 560-565.
2. Sonde, S., Chakrabarti, B., Liu, Y., Sasikumar, K., Lin, J.Q., Stan, L., Divan, R., Ocola, L.E., Rosenmann, D., Choudhury, P., Ni, K., Sankaranarayanan, S.K.R.S., Datta, S., Guha, S. "Silicon compatible Sn-based resistive switching memory". *Nanoscale*, 2018 10(20), 9441-9449.
3. N. Moldovan, J. Logan, R. Divan, "Towards the batch Production of 5 nm Focal Spot Size Zone Plates and Beyond", *Microscopy and Microanalysis*, 2018 24, 278-279.
4. Willa, K., Diao, Z., Campanini, D., Welp, U., Divan, R., Hudl, M., Islam, Z., Kwok, W.-K., Rydh, A. "Nanocalorimeter platform for in-situ specific heat measurements and x-ray diffraction at low temperature". *Review of Scientific Instruments*, 2017 88(12) 125108.
5. Yi, J., Wang, Y., Jung, Il W., Liu, W., de Andrade, V., Xu, R., Jiang, Y., Parameswaran, R., Peters, I.R., Divan, R., Xiao, X., Sun, T., Park, W Il, Tian, B. "3D calcite heterostructures for dynamic and deformable mineralized matrices". *Nature Communications*, 2017 8, 509.
6. Wang, Y-Lei, Xiao, Zhi-Li, Snezhko, A., Xu, J., Ocola, L.E., Divan, R., Pearson, J.E., Crabtree, G.W., Kwok, W.-K. "Rewritable artificial magnetic charge ice". *Science*, 2016 352(6288), 962-966.
7. Humayun, M., Sainato, M., Divan, R., Rosenberg, R. A., Sahagun, A., Gundel, L., Solomon, P. A., Paprotny, I. "Effects of O2 Plasma and UV-O3 Assisted Surface Activation on High Sensitivity Metal Oxide Functionalized Multiwalled Carbon Nanotube CH4 Sensors". *JVST A*, 2017 35, 061402.
8. Li, K., Wojcik, M.J., Ocola, L.E., Divan, R., Jacobson, C. "Multi-layer on-chip stacked Fresnel zone plates: hard x-ray fabrication and soft x-ray simulations". *JBST B*, 2015, 33, 06FD04.