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7.	Brief account of your research interests with special focus on Nano Science and Technology (strictly within 300 words):

Temperature dependence of dislocation dynamics during Nanoindentation in metals

Temperature dictates mechanical properties of materials. In present day applications, materials are rarely utilized at room temperature alone. Meanwhile, temperatures may have drastic effects on the mechanical responses of materials, such as the deformation and fracture properties at different temperatures. Nanoscale testing of materials at non-ambient temperatures is now possible. The ability to perform nanotest measurements at elevated temperatures opens up significant new possibilities in nanotechnology. Sub-zero and high temperature analysis using nanoindentation technology is the first of its kind. Materials behave differently in real-life environments due to thermal loading. The objective of this thesis is to investigate the response of metals to nanoindentation at temperatures above and below the normal room temperature, using a combination of experiments and computer simulations. The metals studied include both face-center-cubic (FCC) and body-center-cubic (BCC) elements, and dislocation dynamics is the focus of his mechanics study.

The experiments are performed with tailor-made Berkovitch tip of radius 100 nm at temperatures of 265 K, 388 K, 348 K, 473 K and 623 K. Single-crystals of tungsten, gold, Aluminum and polycrystalline copper are considered for the investigation. The indentation is done for BCC tungsten on the (111) and (110) crystallographic surfaces, FCC gold on the (111) and (110) crystallographic surfaces, single crystal aluminum with (100) crystallographic orientation and polycrystalline copper at different temperatures. Both the behaviour of material during loading and unloading are analyzed, and the processes are examined both experimentally and by computer simulations. Emphases are placed on the defects generation mechanisms during the elastic plastic contact of crystals. Special attention has been devoted to the elastic response before the onset of plastic yield.

The temperature dependency experiments and computer simulations yield very interesting results. The complete elastic range is found. The onset of the first burst is measured. The onset of plastic deformation is noticed from the periodic bursts. The strain hardening effects, softening effects, strain release effects are noticed at this temperature. Pile up is also noticed. The new phenomena of material under the indenter bouncing back at the end of

	unloading were clearly noticed. From the difference in penetration depth for different temperatures, it is noticed that there is significant increase in penetration depth at higher temperatures. The hardness and elastic modulus also dropped at higher temperatures. The results are also analyzed at different loading rate for various temperatures. A theory can be established in future for the relationship between the temperature and mechanical properties of metals helping in design and selecting suitable materials for real-life environments depending on the thermal loading.
8.	Keywords related to your research interests (maximum 10, different lines separated by commas) Innovations projects Nanotechnology, Nanomechanics, Nanomaterials, Solid state electronics, Information technology, Design, Mechanics, Fluid Mechanics, Mechanical Engineering, materials, projects in electrical, electronics, computer applications, Involved in innovative projects in all the areas of science, technology, education and administration. **Note**: Expertise, exposure and ability in all areas to investigate any kind of projects in general. **Additional projects Involved**: Course development Education, Management research and techniques, Management innovations, , Public Administration, finance, Investment.