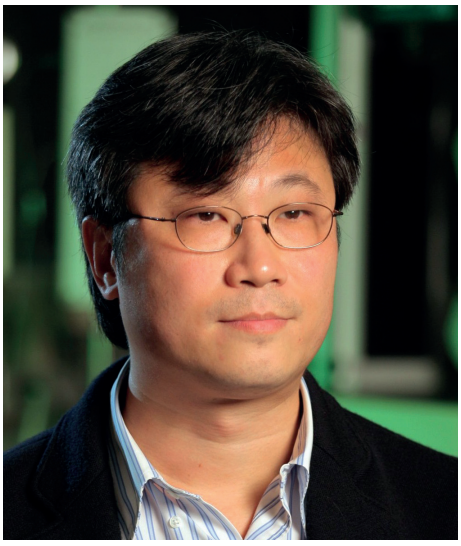
CELEBRATING A CENTURY OF HKU'S RESEARCH EXCELLENCE AND BEYOND

AN INTERVIEW WITH PROFESSOR NGAN, ALFONSO HING WAN

A recipient of the Outstanding Young Researcher Award of The Hong Kong University in 2000-2001, and the Outstanding Researcher Award in 2006-2007, Professor Ngan was also awarded the Rosehain Medal and Prize by the Institute of Materials, Minerals and Mining, UK in 2007, and conferred a higher doctorate (DSc) by the University of Birmingham in 2008. Having published over 100 papers, his research interests include the microstructural basis of mechanical properties in metallic materials, dislocation theory, electron microscopy of materials, novel mechanical testing techniques such as nanoindentation, mechanical properties of thin-films, theoretical modelling of material defects including atomistic simulation and dislocation dynamics simulation.



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1. Could you please share with us briefly about your key research areas?

My research interests include microstructure-property relation of materials, electron microscopy for materials science, and crystalline defects and their modeling. In recent years, I became more interested in the mechanical properties of small (micron to submicron sized) material volumes, nanomechanics and nanoindentation, and nano-biomechanics. I am also interested in understanding the mechanical and other physical behaviour of living cells and other, often nanoscale, protein building blocks of life, and how such behaviour links to diseases and disorders.

2. How did you become involved in this research, were there any challenges encountered along the way and what motivates you to continue in these areas of research?

My earlier work on microstructure-property relation of materials got started from my PhD days at Birmingham University in the UK – that was a direction given to me by my supervisor, but I enjoyed it. The other interests I developed on the way. There were of course scientific challenges in every project, but we like these and the desire to overcome them is our main motivation – every time you overcome a challenge, you derive a lot of satisfaction out of it. The frustrating bits are the non-technical challenges – these mainly involved occasions when our manuscripts or grant proposals got rejected when we were absolutely sure that the reviewers did a lousy job. Sometimes, the reviewer and the editor were simply incompetent – I have a recent experience when we increased the intraocular pressure in the eye of an animal model and quoted the increase pressure in units of mmHg. The reviewer rejected our paper saying that mercury should not be used in the eye – he didn't know that mmHg is a unit for pressure and it doesn't mean Hg is used in the eye! The editor was like a machine who did not read the manuscript and the comments himself, and took the reviewer's view as his decision. They have immense pressure to reject papers nowadays, and if you argue with them, it is like talking to a wall. Sometimes the idea can be so new that the reviewer is not familiar with it, and that's why some of us say it is always safer to stick to the same narrow field, or stay with the same research community that you are familiar with. But I do not think this is correct – at least I do not feel happy this way. Anyway, no system is perfect and peer review still seems to be the best. We just hope that there are enough competent reviewers and editors around.

3. Why do you think your research papers have been highly cited?

The few papers that have been rather highly cited concern a protocol that we developed for extracting an intrinsic material stiffness out of a viscoelastic material, and this is a novel idea, with timely applications involving using new techniques such as nanoindentation on soft samples, such as biological tissues. I guess it is the novelty, timeliness, and the wide applicability that count. But citation counts need to be interpreted carefully, especially when they are used to judge whether someone should be given tenure, or things like that. First, there is field bias as is well-known – some fields have very high citations while others do not. So citation counts only represent the size of the research community, or the speed with which papers can be generated in that field. (I always think some normalized citation factors can be more useful than the simple citation counts – for example, citation counts divided by the average number of authors in a paper in that field?) Secondly, there also seems to be regional bias – in the same field, papers from certain regions tend to attract more citations than papers of the same quality from other regions. I think the best way to make use of citations, in personnel events at least, is to use them as alert indicators to see which pieces of work should be read in depth. The actual decision has to be based on detailed reading and assessment of the work by experts in the field, rather than on the mere citation counts.

4. Do they usually describe a new discovery, methodology, or synthesis of knowledge? Could you summarize the significance of your papers in layman's terms?

As explained above, the papers that have been rather highly cited concern a new methodology for carrying out nanomechanical tests on soft materials. This methodology enables one to obtain a stiffness value of the sample that is independent of the way in which the test is carried out. For hard materials, this is not an issue, but for soft materials such as polymers or gels, or even biological tissues, the previous protocols can only return a stiffness value that would depend on how the test is conducted – so this is not an intrinsic material property. The other group of papers concerns our sorting out of the fundamental mechanisms in the mechanical deformation of materials of micron to submicron sizes. Such understanding is important to the better design of micro-machines.

5. What outcomes or impact on society do you hope to see as a result of your research? Where do you see your research heading in the future?

We will continue to adapt the protocol as described above for characterizing biological tissues, and our aim is to apply this protocol to achieve some understanding of the relation between certain diseases and the relevant smallest building blocks of life. We will also continue to investigate the fundamental mechanisms in material strength and deformation – our aim in this area is to achieve some universal understanding, rather than material-specific mechanisms.