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Archives of Materials Science and Engineering

Editor-in-Chief Prof. Leszek A. Dobrzański

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by the World Academy of Materials
and Manufacturing Engineering

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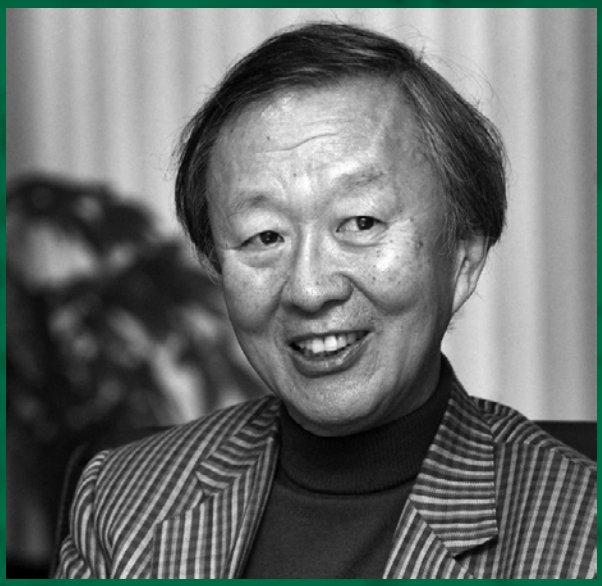
It was said...



PROF. CHARLES KUEN KAO

Former Director of Engineering of Standard Telecommunication Laboratories in Harlow, UK and former Vice-chancellor of Chinese University of Hong Kong

The creator of fundamentals of the transmission of light in fibres

"I'm an engineer, so my real purpose is something that is useful, and it is interesting to extrapolate how improvement can be made and if it is made; and if it is made, how it important it is to serve mankind. Communication, at this moment of my life, I still feel that it is not the invention of something that is important. It is how we can utilize that then to improve life that is important. Unfortunately, these days, we are contaminated by the use of the competitive forces to say, "You must say, 'I did something better than the other,' so the advertising people will generate things that boosts sucking up to possibly beyond what one should claim. In some ways I feel that for instance we now can use computers to do very, very many things. You can do many, many things that are weird and wonderful, but to what extent we need them is still not clear. The bubble burst recently of technology, particularly the IT bubble, was overloaded, so it has collapsed. Obviously it is very important that we push them, but I think the peripheral ways that people look at it and get very excited are based on very thin evidence. And so I think we all should say, "Here are some useful tools. Are they going to be really helpful for us?" And we should question these carefully and use them appropriately. But that is sort of the typical way or engineering way of answering questions."

From Charles Kao: An Interview Conducted by Robert Colburn, IEEE History Centre, The Institute of Electrical and Electronics Engineers, Inc, 26th February 2004

Editorial

Many new and contemporary science branches and disciplines, especially at the interdisciplinary areas of the traditional ones, have emerged since a positivist – Auguste Comte had categorised them. As a consequence of the development of physical metallurgy and many other fields of science and technology connected with a various group of materials useful in practice, materials science was created in the 1950s as the fundamental branch of science and also materials engineering as the engineering knowledge applied in the industrial practice. It is worth noting that just rendering accessible newer and newer technical materials, and with time also engineering ones within the compass of history, decided – as a rule – the significant, and quantum leap at times technical progress, determining improvement of the quality of life not unlike it is today. Therefore progress in the field of the advanced engineering materials is predicted and expected. Many materials design methodology activities changed during last years, are connected with modelling, simulation and prediction of both the technological processes of manufacturing, processing, and forming their structure and properties, and especially of the service and use properties of materials, including those after long time service in the complex conditions, development of safe materials and products technologies, standardisation of materials testing procedures, development of the prediction methodology of the new materials behaviour in service. One should note that many classic calculation models developed to date, employed in materials science, do not fulfil the refined expectations of the designers, especially related to materials – in case of many contemporary material groups or structural phenomena occurring in them, because of the insufficient adequacy of models, and also often because of superposition or superimposition of processes – oftentimes opposing processes, and also due to difficulties in the simultaneous modelling of phenomena occurring at the same time in various scales – from nanometric to metric inclusive, lack of generality of the statistic and parametric equations because of the limited function range encompassing selectively only some material grades or types, so these factors decide the limited usability or simply impossibility to use those models to fulfil all expectations. Moreover, the trial-and-error method is often the ground of the classically used modelling methods and practical verification of the calculation results obtained is needed nearly each time, because of the significantly excessive mass of the employed materials (and, therefore, also of the products), and the need to employ the high values of the safety factors in product design, because of the insufficient dependability of the models used. Absence of the relevant analytical models is frequently the reason for stopping the progress of the products materials and technological design processes. This stops also the R&D projects in many materials engineering areas, forcing the classis trial-and-error method approach with the extensive experimental investigations plan, even if those experiments are statistically planned. All this causes also the unjustified increase of costs of such investigations and essential extension of the lead time needed to solve the scientific problem of the significant importance for the implementation practice. “As much science as there is mathematics”. This is the traditional formula which acquires a quite new meaning today. Perhaps it should be – “as much science as there is computer science”?, or perhaps just – “as much science as there is prediction”!

There is a general requirement for the reliable and adequate models both for materials properties prediction for fabrication of the expected products from them, and for materials life prediction, and also products made from them, after the duly planned and expected service life. Only this approach ensures effectiveness of the materials and technological design of products. Traditional calculation models cannot meet such requirements oftentimes. Therefore, the so called “Computational materials science” and “Computational surface engineering” are being developed intensely as the vanguard branches of the contemporary materials science and materials engineering. On one hand the mathematical statistics models are used, but mostly the artificial intelligence models, including, among others, neural networks, genetic algorithms, expert systems and fuzzy logic, fractal analysis, and also the multiscale modelling beginning from the contemporary physics models in the nanometric scale up to the numerical methods in the mezoscale, and the Virtual Reality tools. However, development and implementation of such models calls for setting up extensive databases and knowledge bases in advance, which require wide-ranging and methodically planned classical materials science investigations. The presented modern approach to the solution of issues of materials engineering and surface engineering requires suitable education of engineering staff. It became basis of the application for financing of totally new in the European scale branches of studies realised at present by the Institute of Engineering Materials and Biomaterials of the Silesian University of Technology: “Applied computer science and computational materials science”, “Nanotechnology and materials processing technologies” and “Materials engineering” profiled to dental engineering and industrial management. This education is totally financed in the framework of INFONANO project in the framework of the Operational Programme Human Capital financed in Poland in the framework of the European Social Fund. The development of the scientific staff in the field of “Computational materials science” and “Computational surface engineering” is foreseen in the framework of the application for financing in Poland the next project DEMCOMAS in the framework of the Operational Programme Innovative Economy. The equipment support for those activities was ensured in the framework of the project BIOFARMA in the framework of the Operational Programme Innovative Economy, MERMFLEG in the framework of Regional Operational Programme of the Silesian Region and LANAMATE qualified after the positive content-related evaluation to the second stage of the contest in the framework of the Operational Programme Infrastructure and Environment. The described activities allow for the positive evaluation of the perspectives of the evaluation of modern specialists of materials engineering in Poland.

The most important information of the last weeks for P.T. Authors and P.T. Readers of Archives of Materials Science and Engineering and two other journals published by the International OCSCO World Press, such as the Journal of Achievements in Materials and Manufacturing Engineering and Archives of Computational Materials Science and Surface Engineering is the one that all our papers were included to the list of journals indexed by the Directory of Open Access Journals. The result of the thorough analysis made by the referring subject is the confirmation of the high level and broad scope of influence of our journals. We are happy because of that great success and sure that it is important not only for us who edit and publish those journals but mainly for P.T. Authors and P.T. Readers of our journals. Handing to P.T. Readers the next volume of our journal we encourage P.T. Authors for the publication of their next achievements and also to the promotion of their own participation in the programmes financed from the European Union resources.

Prof. Leszek A. Dobrzanski M.Dr H.C
Editor-in-Chief of the AMSE
President of the WAMME
President of the ACMSSE

Gliwice, in 2009