Table 1. Universities with highly cited scientists

Materials science	
Penn State	12
Texas	6
California–Santa Barbara	5
Stanford	5
MIT	5
North Carolina State	5
Oak Ridge	5
Max-Planck	5
Penn	4
Illinois	4
Northwestern	4
UC–Berkeley	4

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Cited Researchers in Materials Science were published. Reflecting the importance of other scientific fields to materials science, the MRI is composed of researchers from sub-units as disparate as the College of Medicine, the College of Agricultural Sciences, and the Department of Mathematics, as well as the more traditional engineering, chemistry, and physics departments.'

What they did not (could not) comment on was another fundamental orientation which informed our research strategy. Penn State's MRL was committed to 'applications-driven basic science'. From its first day in 1962, we proactively coupled to industry – *not* for money but for problem selection – identifying the more significant ones. We were 100% committed to a method of research newly baptized as 'Exploratory Experimentation' (see Ribe, H. and Steinle, F., *Phys. Today*, July 2002, pp. 43–49) along the well-beaten path from Goethe to Michael Faraday to Edwin Land. Because the faculty were not committed to theory-driven (as is so much of modern peer-review) or theory-limited research, they were able to come up with a succession of substantial innovations.

The science policy implications for India which may be worth discussing from these data, within the Indian R/D context, are (a) the importance of genuine interactive intimate interdisciplinarity and inter-institutional coupling; (b) applications-driven basic science as the route to the best basic science; (c) the 'exploratory experimentation' approach; and (d) last but not least, the genuine human-friendly collective as the basis for research work, as it is for all of life.

From a long distance with only a modest database to draw on, I would – as a science policy advisor to successive Governors of Pennsylvania, and various Federal Agencies – merely pass on for what it is worth my reactions to India's research in materials. They are adherents of a fundamentally false theory – the so-called linear theory: science leads to applied science which leads to technology. It dominated US policy from about 1950 to 1993–94; and it infected the world (except early Japan and China). In 1993–94, the US industry bit the bullet, acknowledged its absurdity and shut down basic research not connected to or driven by a product. Witness the status of the mighty icons of Western research, Bell Labs, IBM-Watson, DuPont Experimental Station. They accepted Derek de Solla Price's (Yale's great historian of science) aphorism: 'Thermodynamics owes more to the steam engine then vice versa', and went on to fund as much basic research as before – driven by a (potential) product. I believe at least 90% of India's research should think about Price's wisdom.

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NEWS

Indian scientists honoured by Third World Academy of Sciences

The Third World Academy of Sciences (TWAS) has announced its 2003 prize winners in eight fields of scientific research. The annual TWAS Prizes rank among the highest scientific accolades given to scientists in developing countries. Each TWAS Prize carries a cash award of US $ 10,000.

Eluvathingal D. Jemmis: He obtained his Ph D from Princeton University and gained postdoctoral training at Cornell University, both in the USA. He returned to India as a lecturer in 1980 and was promoted to professor in 1990. Specifically, he developed models to explain why different versions (isomers) of the same polyhedral molecules (in this case, carboranes, made of carbon and boron) had different energies. Carboranes are now finding uses in liquid crystal devices and drug development. He also developed rules (known as Jemmis' Rules) to explain the detailed structure of boron and boron-rich molecules. Attempts are now being made to make connections between boron and fullerenes or 'buckyballs' – spheres of 60 carbon atoms that have potential uses in semiconductor components. Jemmis has been elected to the Indian Academy of Sciences and the Indian National Science Academy and, among other awards, has received the Shanti Swarup Bhatnagar Prize of the Indian Government's Council of Scientific and Industrial Research CSIR).

Kaigala V. Subbarao: The Deccan Traps are one of the largest volcanic provinces in the world, consisting of a layer of solidified lava flows more than 2000 m thick and covering more than half-a-million square kilometres in west-central India. Indeed, the eruptions that created the Deccan flows were so massive that they have been credited with causing the extinction of the dinosaurs. The Deccan Traps are also one of the best-studied flood basalt provinces in the world—thanks mainly to the work of Kaigala V. Subbarao.

Subbarao obtained his bachelor degree from Andhra University and his doctorate from Sri Venkateswara University. He then spent six years studying abroad before returning to the Indian Institute of Technology in 1973, where he still teaches. He is credited with applying modern geochemical and rock magnetic techniques to decipher the stratigraphy, structure and correlations of lava flows across widely spaced regions of the Deccan. He used these magnetic techniques to show that, for example, the Narmada flows are older – and represent different volcanic eruptions – than those of the Western Ghats. Among his other works, Subbarao has recently identified a new volcanic province along India's east coast; he has created a chemical database for nearly 10,000 rock specimens (considered one of the largest and best in the world); and has edited seven volumes on the Deccan, and written three popular field guides.