

## Optimum utilization of local mineral resources

Yaseen Iqbal

*Materials Research Laboratory, Institute of Physics & Electronics, University of Peshawar,  
KPK, Pakistan*

E-mail: [dryaseeniqbal@yahoo.co.uk](mailto:dryaseeniqbal@yahoo.co.uk), [yaseeniqbal@upesh.edu.pk](mailto:yaseeniqbal@upesh.edu.pk)

Optimum utilization of local resources is key to economic development of a nation. Pakistan is home to many varieties of minerals, some of which make it prominent in the mineral world. On the one hand, exploration of Pakistan's mineral wealth is far from complete, particularly in the north and northwest of the country while on the other hand its optimum utilization has not been taken seriously. This talk will focus on the academic approach required for the upgradation and engineering of these resources. This obviously needs the introduction of Materials Science into our institutions which is an interdisciplinary applied science related to the designing and processing of compositions with tailored properties for specific applications. The desired properties are engineered and modified by structural modifications at micron, atomic or molecular scale. It covers the areas from structural ceramics to nano-science and nanotechnology. Thus Material Science can be considered as a discipline of applied science that deals with the "transformation of minerals explored and identified by geologists, processed and purified by process engineers by tailoring the physical, chemical, mechanical, electrical, electromagnetic, and biomedical characteristics of these materials into useful materials for possible development into marketable components/products by material engineers". For example, a number of electro-ceramics materials are currently being designed and processed for various applications e.g. ultra high speed local area networks (LAN), mobile handsets, millimetre-wave applications and intelligent transport system (ITS). The use of dielectric ceramics oxides has reduced the size and cost of devices like filters, oscillators, ranging from cellular phones to global positioning systems (GPS). Various devices function at specific frequencies, e. g. cellular phones work at 900 MHz and 1.8 GHz, blue-tooth at 2.1-2.5 GHz, GPS at 12.6 GHz, local multipoint distribution services (LMDS) at 24–40 GHz and automotives at 77 GHz. Thus, the range of useful properties and hence compositions has significantly broadened during the past few years. Materials research interests at Peshawar range from vitreous ceramics to electro-caloric and piezoelectrics.