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Opinion Article

Changing Face of Minerals and Materials Science

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Opinion

There was a time where my initial education as a Metallurgical Engineer would serve me well as we expanded our horizons to other materials.We studied mineral processing, transport phenomena and metal processing.I worked in the semiconductor industry for a while and found that my training served me well in crystal growth, defect identification and semiconductor processing technology.I did research at Imperial College, London, where I found that I understood the influence of defects on material properties applied just as well to ceramics and intermetallic compounds as it did to metals. But I was surprised as young professor at University of Washington to be contacted by the Bioengineers who were working with the medical physics faculty-they had a materials problem that they did not understand!It had to do with the use of lithium fluoride [LiF] as a radiation detector for personnel dosimetry.These well trained scientists did not understand that variations in the cooling rate of the materials [yes, LiF] could change the defect structure and thus the resultant properties [1].Wow-a whole new area of materials science emerged, with world-wide interactions [2].

Then the semiconductor processing area provided more ideas using not just silicon but a variety of other materials [3]. Applications expanded in sensors, dosimeters, and specialty compounds adapted to many different uses. Looking at my colleagues, I find continually broadening research topics, including

A. New techniques for material characterization [4],

B. Additive manufacturing of net shape magnetic materials [5]

C. Transport behavior in thermoelectric materials [6],

D. Means of detecting damage in carbon fiber composites [7],

E. Laser refrigeration of nanocrystals [8],

F. Microscopy of self-assembled materials and biomimetic[9],

G. Engineering nanocrystalline aggregates for solar cells [10],

H. X-ray photoelectron spectroscopy [11],

I. Sol-get synthesis of nanodiamond aerogel [12],

and yesterday I saw a news article where materials scientists had developed a mobile device that destroys viruses and bacteria on surface using multiple electromagnetic sources to effectively kill microbes [13].Talk about relevant to today's Covid-19 crisis!

So, what about metallurgy?Is it old fashioned? Of course not!There is plenty of applied work such as on the application of aluminum to replace steel auto bodies, new alloys for turbine blades and new coating to reduce atmospheric deterioration. Universities and industry continually apply mineral processing and metallurgy to problems in many areas, which tells me that my basic education is still relevant and being applied at all levels to enhance today's society.

References

1. Guilmet GM, Stoebe TG, Dawson HI (1970) Effect of quenching temperature and rate on thermoluminescence in high purity lithium fluoride. Health Physics 19(4): 582-584.

2. Stoebe TG, Chen TC, Smith KR, Thibado J, Gasiot J,et al. (1996)Solid state integrated radiation sensor development. Rad Prot Dosim 66: 427-430.

3. Yoo HM, Ohuchi FS, Stoebe TG(1993) Influence of substrate temperature on the growth of InGaAs layers on (111)B GaAs.J Vac Sci Technol B 11: 1-4.

4. Zhang S, Mao S, Arola D, Zhang D (2014)Characterization of the strain-life fatigue properties of thin sheet metal using an optical extensometer. Opt Laser Eng 60: 44-48.

5. Hasanov S (2000) Tennessee Tech Univ (private communication), US.

6. Zhao W, Wei P, Zhang Q, Peng H, Zhu W, et al. (2015) Multi-localization transport behavior in bulk thermoelectric materials. Nature Comm 6: 6197.

7. Toivola R, Jang SH, Baker S, Jen AK, Flinn BD(2018) Thermochromic polymer film sensors for detection of incipient thermal damage in carbon fiber-epoxy composites. Sensors 18(5): 1362.

8. Zhou X, Smith BE, Roder PB, Pauzauskie PJ (2016) Laser refrigeration of ytterbium-doped sodium-yttrium-fluoride nanocrystals. Adv Mater 28(39): 8658-8662.

9. Sarikaya M (1994)Microscopy of self assembled materials and biomimetics.J Electron Microscopy Techniques and Research 27(5): 359-467.

10. Gao R, Liang ZQ, Tian JJ, Zhang QF, Wang LD, et al. (2013)ZnO nanocrystalline aggregates synthesized through interface precipitation for dye-sensitized solar cells. Nano Energy 2: 40-48.

11. Wang K, Zheng X, Ohuchi FS, Bordia RK, Riedel R (2012) The conversion of perhydropolysilazane into SiON films characterized by X-Ray photoelectron spectroscopy. Journal of the American Ceramic Society 95(12): 3722-3725.

12. Manandhar S, Roder PB, Hanson JL, Lim MB, Smith BE, et al. (2014)Rapid sol-gel synthesis of nanodiamond aerogel.J Mater Res 29(24): 2905-2911.

13. https://www.geekwire.com/2020/uw-researchers-working-flashlight-like-device-destroy-viruses-bacteria-surfaces/.