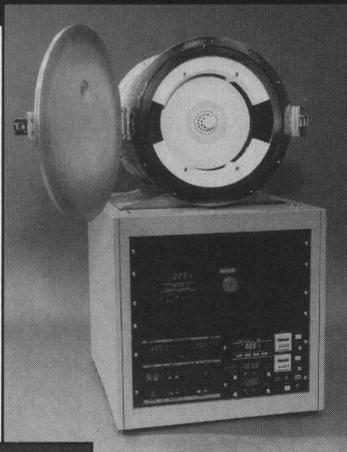
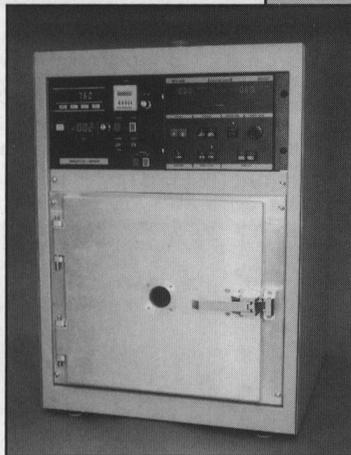


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## Unburying Diamond CVD Advances from Russia in 1960s, 1970s

To the Editor:

The article, "Diamond Synthesis: The Russian Connection," by R.C. DeVries, A. Badzian, and R. Roy (*MRS Bulletin*, February 1996, p. 65) was of outstanding interest for me.

In October 1966, I together with A.V. Lavrent'yev grew the epitaxial diamond films on natural diamond seed crystals by the method of chemical transport reaction. I know authentically that, in Russia, within about ten years of that date, I and my colleagues (A.E. Alexenko, L.L. Bouilov, A.V. Smol'yaninov, and others) have grown such films (coherent, transparent, with a thickness of one or more microns) only by that method.

The picture of the faceted surface from the 1971 booklet mentioned on p. 72 (ref. 95) is related to diamond, obtained by the transport reaction in the system: graphite-hydrogen-diamond (ref. 92), and not by the  $\text{CH}_4\text{-H}_2$  mixture mentioned on p. 72. The optical micrograph by Nomarsky contrast was done by Professor E.I. Givargizov of the Institute of Crystallography RAS per my request.

Of course it would be incorrect to state that in the 1960s and 1970s that researchers in Russia and other countries had a clear understanding of the mechanism of the diamond growth from the vapor phase, and of the role of atomic hydrogen. However, it seems remarkable that in my PhD dissertation as early as 1966 atomic hydrogen is indicated as a participant of carbon transport from the graphite source to the diamond substrate. Moreover, in the Author's Certificate (ref. 92), the content of crystallization medium by the chemical transport reaction, specifically  $\text{C}_2\text{H}_2$ ,  $\text{C}_2\text{H}$ , H, and  $\text{H}_2$ , have been indicated. It is difficult to suppose that at that time somebody had more complete knowledge than my colleagues and I. Alternatively, it is appropriate to wonder where films are that were grown by other researchers during that period.

The article is fairly correct in stating that the essence of the technique used by us has not been published in the 1960s and 1970s because of the secrecy regime that existed at that time. But now there is good opportunity to restore the chain of historic events and to consider their mutual influence. I am convinced that the authors made a valuable contribution in that direction. I hope also that the witnesses and the immediate participants of the considered events, Dr. A.E. Alexenko, Dr. L.L. Bouilov, and Prof. E.I. Givargizov, may also give their opinion on the origin and development of diamond CVD research in Russia.

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## Introductory Materials Text Needed to Anchor Grad Students

To the Editor:

In their letter, "Educational Priorities of Graduate Education in MSE Must Undergo Reforms," *MRS Bulletin*, May 1996, p.4, Sutton and Balluffi remark on the need for broadening experiences in PhD programs. One item they did not discuss was the availability of educational materials useful for such "general education" in MSE. Although the authors did cite an observed resistance to broadening instruction, I expect that a survey of students, as opposed to faculty, would yield different results. Beginning graduate students whose background is not in MSE particularly often request something to anchor their understanding aside from the conventional specialized course text materials. Currently there is a number of very suitable MSE undergraduate textbooks available in print form, but since the publication of Van Vlack's *Materials Science for Engineers*, Addison-Wesley, 1970, and Guy's *Introduction to Materials Science*, McGraw-Hill, 1972, nothing has come available which might be used at a higher level than the most introductory. Those latter two texts presented concepts at a more advanced level and could have been used for beginning MSE graduate students of those times. Apparently neither Professor Van Vlack nor Professor Guy were encouraged by their publishers to pursue that market. Perhaps the broadening need cited by Sutton and Balluffi could be provided with a new text product similar to the earlier attempts of Van Vlack and Guy.

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