

Publish? No, Not Yet!

The Paradoxes of Russia

Svetlana Koretskaya and Vsevolod Gantmakher

The discovery of high temperature superconductors coincided with the dramatic changes in political and economic life in Russia. Consequences of the upheaval have had a dual effect on Russian science. On the one hand it has become more open towards the outside world, on the other hand the general economic decline in the country has caused an abrupt reduction of financial support for science and successively diminished its potential.

An example of openness, now evident, is the constantly increasing number of publications by Russian scientists in international journals, including papers on high temperature superconductors (HTS). Before the discovery of HTS all research in Russia relating to the synthesis of superconducting materials with critical temperature higher than 25 Kelvin was kept secret. For a long time these materials were regarded as being of strategic value for the defence industry. But recent developments in the HTS field have demonstrated the absurdity of this view: until now most of the materials created have not found their industrial application.

However, restrictions had not allowed Russian scientists to publish their first research results on HTS straight away. The

first articles (as many as fifty three at once) appeared only in June 1987 in a special issue of *Journal of Experimental and Theoretical Physics Letters*. Now, the situation has changed significantly.

During the first wave of investigations (1982-1992) the number of publications (by authors of any nationality) on HTS presented in scientific journals was about 6000 per year. By 1994 it had dropped to a steady value of 3500 to 4000 publications per year, and among them about 500 (ie one-sixth to one-seventh of the total) were articles by Russian scientists. The constant growth of Russian publications in international journals is clearly seen from the chart below.

Unfortunately, there are also many examples of the negative influence of perestroika (Russian reformation of political and economic system). The most regrettable of them, perhaps, is connected with the construction of specialized synchrotron irradiation sources.

Russia had gained great experience in applying synchrotrons as high-energy devices (like the synchrotron C60 in Moscow and the 'Pakhra' synchrotron located in Novosibirsk in the Moscow region). The need for specialized synchro-

tron radiation sources was realized 20 years ago.

The most prosperous industrial departments, Minsredmash and MEP, started construction of two almost identical sources at the Russian Scientific Center (the Kurchatov Institute) and at the Zelenograd Center for Microelectronics. The design and manufacture of these machines were carried out by the Budker Institute of Nuclear Physics. An outstanding result of their efforts was the construction of a complex of specialized synchrotron radiation source-accumulators consisting of 'Sibir 1' (0.45 GeV) and 'Sibir 2' (2.5 GeV).

The construction of synchrotron sources both at the Kurchatov Institute and the Zelenograd Center for Microelectronics were proceeding concurrently, the first one being optimized for investigations in nuclear materials science and the second one to be applied in semiconductor materials science and nanotechnology for the production of microchips.

However, due to abrupt cuts in funding today they are confronted by a difficult situation: at the Kurchatov Institute the large ring with rather weak infrastructure has been assembled and is currently under testing, while at Zelenograd a laboratory building, with total area 20,000 square metres, around the lacking ring has been constructed and is fully equipped. The question is whether both of these sources will function in the near future, or just one of them, and which one. The solution will depend on how efficiently each of them is promoted in government circles. *Svetlana Koretskaya and Vsevolod Gantmakher are the Russian correspondents for Europhysics News*



Left The number of articles, by Russian scientists, that have appeared in Russian and international journals on high temperature superconductors. (Articles published by Russian scientists in 1992 and 1993 are not included because of the scarce supply of Russian libraries with international journals in those years)