In this issue

Gamma-ray diffraction

X-ray diffraction, discovered in 1912 paved the way for unraveling structure of solids in terms of location of atoms within bulk crystal structure and thus the subject of crystallography became one of the most important activities of solid state physics research. With the availability of thermal neutron beams at nuclear research reactors in the late forties, the complimentary technique of neutron diffraction got established; this technique, in addition to providing complimentary information to that from X-ray diffraction, led to unique results concerning magnetic structure of crystals. The last fifty years have seen emergence of phenomenal understanding of structure of a variety of complex materials thanks to these two techniques. Yet another diffraction technique which has a lot of promise is the gamma-ray diffraction; this technique has been used since the seventies to investigate crystal physics 'where the other techniques were not so effective'.

D. B. Sirdeshmukh has discussed the nature of gamma-ray diffraction technique and its several applications in the review article 'Gamma-ray diffraction – A powerful tool in crystal physics' (**page 631**). Monochromatic gamma-rays (of wavelength nearly 0.02 to 0.06 Å) from fairly long lived radioactive sources have been used in the gamma-ray diffractometers. The shorter wavelength of gamma-rays compared to that of X-rays provides a number of advantages in diffraction studies. After describing these aspects, Sirdeshmukh has dealt with a variety of applications with suitable examples related to the study of: structure factors, precision measurements of structural parameter changes due to phenomena such as magenetostriction, mosaicity, magnetic domain structure and rate of crystal growth.

Research based on gamma-ray diffraction may be said to be in its infancy as only a few advanced laboratories, principally in the West, have set up facilities for gamma-ray diffraction. Backed by the vast experience that this country enjoys in crystallography, it is well within our reach to undertake investigations in materials science via gamma-ray diffraction. A new thrust is needed to initiate techniques like neutral atom scattering, low temperature laser trapped atom spectroscopy or gamma-ray diffraction, if we do not wish to miss the current trends in Materials Research.

K. R. Rao

Pollution and human reproduction

Reproduction and adaptation are the two most critical attributes for survival of a living species. Humans have not done too badly on either score. Since the days of Malthus, the prospect of burgeoning human populations has often triggered off speculation about doomsday scenarios on an impossibly over-populated planet. Nowhere are the effects of overpopulation felt more than in the urban centres of the developing world. Bangalore, where this journal is based, is no exception. Paradoxically, in this issue (**page 621**) Mehta and Anand Kumar draw attention to the declining semen quality in Bangaloreans. This study comes in the wake of reports from around the world that fertility and reproductive health may indeed be on the decline. The declining quality of the environment has always been viewed as a possible cause; with several studies suggesting a connection between air pollutants and low sperm counts and diminished sperm viability.

The results from Bangalore show a significant fall in semen volume and sperm concentration and increased oligospermia, which apparently correlate with the levels of suspended particulate matter in the air. There has already been considerable speculation on the molecular origins of the connection between pollution and reproductive health. Synthetic chemicals which can trigger estrogen-like responses may indeed be prime suspects in causing cancer and reproductive problems. Indeed a paper published last year (Arnold *et al.*, *Science*, 1996, **274**, 1489) revealed a dramatic synergistic effect of a combination of two polychlorinated biphenyls. These studies have been questioned more recently (*Science*, 1997, **275**, 1879), suggesting that the final verdict is still to come. Ironically, population control may in fact come about by an unanticipated environmental feedback mechanism. This is certainly a point to ponder when stuck on urban roads enveloped in clouds of dense automobile exhaust.

P. Balaram