Diamond and Related Materials

Carbon in the form of diamond is the stuff of dreams, and the image of diamond evokes deep emotions in humans. The many remarkable properties of diamond, in part because it is the atomically densest material in the universe (diamond is the hardest material and its thermal conductivity is five times larger than that of copper), can be used in several applications. Following the successful synthesis of diamond by high-pressure/high-temperature methods in the mid 1950s, in the last decade there was an explosive growth in the synthesis of diamond films and their industrial applications, providing the experimental basis for the understanding of the processes of synthesis and their correlations with physical properties. Today, almost all diamonds used in industry are synthesized. At the end of the last decade, A. Y. Liu and M. Cohen (Science **245**, (1989) 841) proposed that a hypothetical new material, $\beta - C_3N_4$, could be harder than diamond. It was one the opportunities in Materials Science that a theoretical work motivated so large experimental efforts. Despite the fact that a clear evidence for the existence of this material had not been published yet, several remarkable goals were achieved. An an example, today the protective coatings used for hard magnetic disks are amorphous carbon nitride films developed in the last few years.

This issue of the Brazilian Journal of Physics assesses the current state of the research on Diamond and Related Materials. In this last category, materials with properties similar to those of diamonds can be found, as cubic-boron nitride, carbon nitrides, amorphous carbon films, etc. We tried to provide an overview of different aspects of this challenging area of research in Materials Science. The articles are update approaches to the corresponding specialties, and we expect that they will help to stimulate the scientific activity in the field.

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