MPHYCC-7 ELECTRONICS I

Unit 1: SEMICONDUCTOR

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SEMICONDUCTOR TECHNOLOGY DRIVERS IN EARLY 21st CENTURY

Figure 6 is constructed in order to illustrate developmental trends currently observed in semiconductor engineering. As the horizontal bars in this figure indicate, integrated circuit technology continues to play a role of a key technology driver. The selection of materials used besides silicon is growing continuously, device design evolves and the focus is shifting from shear speed and power efficiency to more application specific solutions based on the range of materials and transistor layouts available.

At the photonics end of the spectrum, light emitting and detecting devices clearly continue as a self-contained technical domain with growing impact on an overall semiconductor business particularly through the increased role of semiconductor devices in display technology. The new emphasis in LED technology, which emerged during the last decade as a major force, is an urgent need to use LEDs in lighting applications as a replacement for highly inefficient incandescent and fluorescent bulbs. In this respect the development effort spreads over a range of device solutions including inorganic and organic LEDs as well as quantum dot based light emitters.

During the last decade, several new, or renewed, applications of semiconductors have emerged as major players (see Fig. 6), and hence, can be seen as technology drivers in the

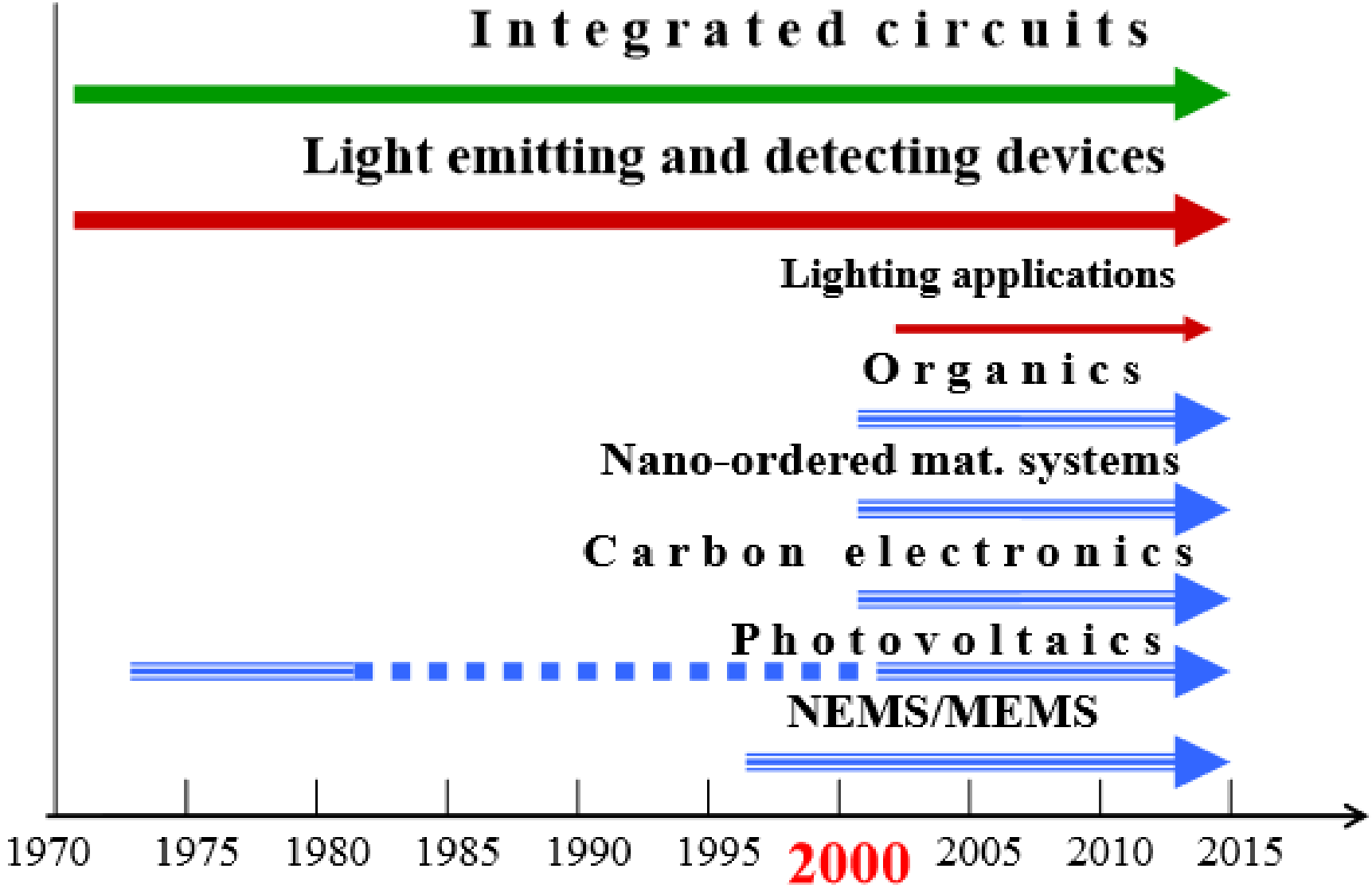

Fig. 6 *Lead technical domains driving semiconductor technology.*

early 21st century. Those emerging areas of semiconductor science and engineering are briefly reviewed below. It needs to be emphasized that the selection of those areas is based entirely on the Author’s assessment of the observed trends and as such is open for discussion. Another point which should be stressed is that several among new technologies are pursued to overcome roadblocks digital IC technology will be facing in the future and not necessarily as self-contained technical domains.

CONCLUDING REMARKS

This overview attempted to identify trends which emerged as forces driving progress in semiconductor science and engineering in early 21st century. The discussion presented leads to the conclusion that semiconductors now more than ever before continue to have a major impact on the evolution of our technical civilization. It is also quite evident that, although, several developments continue to be driven by the long-term needs of digital electronics, there is a range of new technologies which open up new areas of application for semiconductor materials well beyond today's uses. Some of them were briefly discussed in this overview.

Finally, it should be once again pointed out that this overview is concerned with new developments on semiconductor arena which are either commercialized already or are on the direct path to commercialization in the near future. Developments in several emerging domains such as spintronic, or use of semiconductors in broadly understood "bio" applications, are left to the future discussion. Their impact will be judged based on the future success of the process of conversion of the theoretical concepts into practical solutions.

The End

Thanks…….