

C-21

Development of DVD and Standardization

The development of DVDs started from the reproduction of the motion pictures and now it is a record medium, e.g., for the recording and storage of personal computers, widely used in the IT field. Red LD and optical heads of high numerical apertures of 0.6 were used for this. The Disc gradient margin narrowed due to such means was handled by reducing the thickness of the disc substrate. The part vulnerable to disc dirt was dealt with by a combination of powerful error-correction technologies. Thanks to these technologies, the two-hour reproduction of movies became possible and commercialization was achieved. In addition, technologies were integrated with the cooperation of many companies, and standardization was attained. Because of this, it became widely used for personal computers in addition to AV use.

DVD: Digital Versatile Disc

C-22

Perpendicular Magnetic Recording

For magnetic recording, the principle was to magnetize with a ring-shaped magnetic head in the in-plane direction and a magnetic multi-layer in the record medium. However, some problems did exist in this method. To point out and to solve these problems, S. Iwasaki constructed the self-consistent magnetization theory—record signals could not be taken out because magnetization in the medium became rotational magnetization which formed a closed loop as density grew. Furthermore, he proposed the perpendicular magnetic recording theory to eliminate the rotational magnetization mode and to realize high-density recording. In order to prove this, he developed a perpendicular single polar magnetic head using a cobalt chrome-based perpendicular recording medium and magnetic thin film. With a combination of these things, in 1977, he achieved perpendicular magnetic recording for the first time in the world. Going through further theory constructions and experiments, he defined the basic properties of perpendicular recording/reproduction systems and showed the direction of super-dense recording methods. He also developed a magnetic recording simulator before the rest of the world and established the leading principles for the study of perpendicular magnetic recording. He actively carried out experiments about signal processing and error evaluation required for the introduction of perpendicular magnetic recording onto hard discs. Most current perpendicular magnetic recording equipment is now based on the perpendicular magnetic recording method thanks to his powerful support.