

### **Behavior of Magnetic Domains in Single Magnetic Nanowire with Shallow Trench along Length Direction Observed by Magnetic Force Microscopy**

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**W**e have proposed new magnetic memories using parallel-aligned nanowires without mechanical moving parts, in order to achieve the ultra high transfer rate of more than 144 Gbps for Super Hi-Vision TV. In the magnetic memory using nanowires, the data are stored as the magnetic domains with up or down magnetization in magnetic nanowires, and the domains are shifted quite faster by applying an optimum current along the nanowire direction for data writing and reading purposes. Since the electric circuits and the insulation space between the neighbor nanowires are necessary for moving the magnetic domain walls, the areal recording density is essentially reduced as compared with that of conventional hard disk drives. In this study, in order to increase the areal recording density of magnetic nanowire memory, we have tried to make one magnetic nanowire act as virtual multiple data tracks. A shallow scratched trench was introduced using scanning probe microscopy along the length direction on the surface of a single nanowire to form multiple internal tracks, and we succeeded in realizing a couple of virtual track states.

### **An Automatic Broadcast System for a Weather Report Radio Program**

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**H**ere we describe a speech-synthesis method using templates that can generate recording-sentence sets for speech databases and produce natural sounding synthesized speech. Applying this method to NHK weather report radio program reduced the size of the recording-sentence set required to just a fraction of that needed by a comparable method. After integrating the recording voice of the generated recording-sentence set into the speech database, speech was produced by a voice synthesizer using templates. In a paired-comparison test, 66% of the speech samples synthesized by our system using templates were preferred to those produced by a conventional voice synthesizer. In an evaluation test using a five-point mean opinion score (MOS) scale, the speech samples synthesized by our system scored 4.97, whereas the maximum score for commercially available voice synthesizers was 3.09. In addition, we developed an automatic broadcast system for the weather report program using the speech-synthesis method and speech-rate converter. The system was evaluated using real weather data for more than 1 year and exhibited sufficient stability and synthesized speech quality for broadcast purposes.