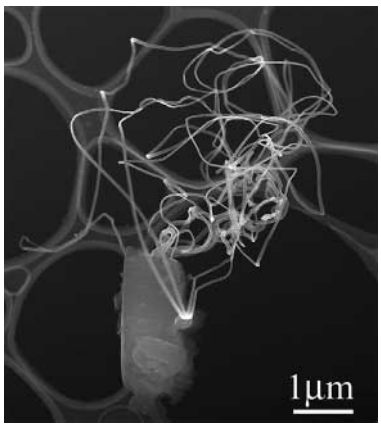
Preparation of Long Silver Nanowires with a High Aspect Ratio

We succeeded in preparing long silver nanowires with a markedly high aspect ratio using Ag^+-containing matrix by irradiation of controlled electron beam. A typical scanning electron micrograph is shown in Fig. The nanowire grew slowly like a spider spinning a thread and a long nanowire of *ca.* 40 nm in diameter and 115 μm in length on the micrograph was finally obtained. The aspect ratio of the wire reaches more than 2,000, which is, to our knowledge, the highest among the nano-order silver wires reported to date. A selected area electron diffraction (SAED) pattern in a part of the nanowire indicated that the nanowire was a silver metallic crystal with a face-centered cubic structure.



SEM micrograph of a silver nanowire

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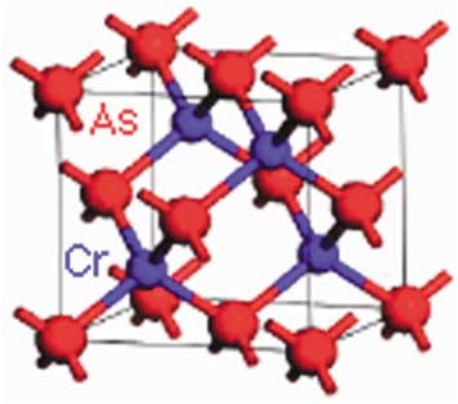
Material Design of Half-Metallic Ferromagnet and the Synthesis

The present status of the magnetoresistive device consisting of magnetic tunnel junctions has nearly reached the physical limit, due to the fact that the intrinsic spin-polarization of the ferromagnetic electrode is 50 % at most. We aim at the development of a 100% spin-polarization ferromagnetic material. The zinc-blende CrAs has been designed by *ab-initio* calculations and the calculation predicts the highly spin-polarized electronic band structure. We have succeeded in growing the zinc-blende CrAs thin films by molecular-beam epitaxy method. This is the first successful computational material design followed by the realization.



Schematic crystal structure of the zinc-blende CrAs designed by *ab initio* calculations

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