Establishment of a Technique for Production of High-performance Thin Films with Laser Irradiation

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By combining a metalorganic deposition (MOD) method with an excimer-laser annealing technique, we have developed a novel process, excimer-laser-assisted MOD (ELAMOD), to produce high-*Tc* oxide superconducting films ($YBa_2Cu_3O_7$: YBCO). The process realized the improvement of film characteristics as well as the enhancement of film production efficiency. In the production of epitaxial YBCO thin films, we have achieved critical current densities, *Jc*, of over six million A/cm^2, which is of the world's highest class. This value is comparable to or greater than those of superconducting thin films produced by high-cost physical processes. Our process enables the cost reduction and mass production of thin film devices, long tapes, large-area devices, etc.

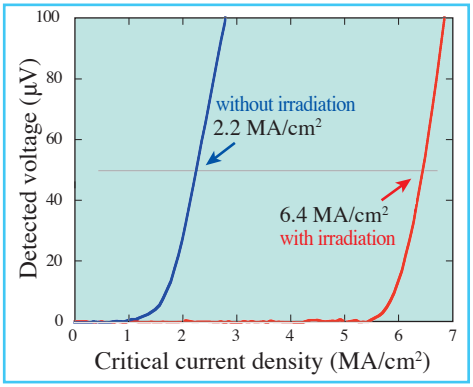

Figure : Performance gain by laser irradiation

Development of a Liquid Crystalline Organic Semiconductor Forming a Helical Structure

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Cholesteric liquid crystals have been drawing much attention because of their helical structure, which can be applied to circularly polarized emission and optically pumped laser. However, conventional cholesteric liquid crystals are insulators and cannot be applied to electrically pumped devices. We synthesized cholesteric liquid crystals exhibiting semiconductive carrier transport properties. A dimeric cholesteric semiconductor was also synthesized and circularly polarized luminescence was observed.

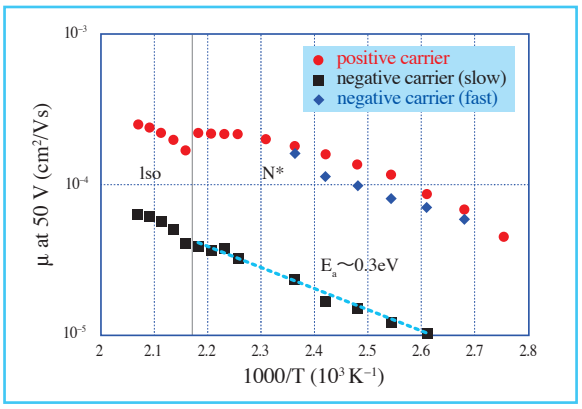

Figure : Temperature dependence of charge transfer mobility