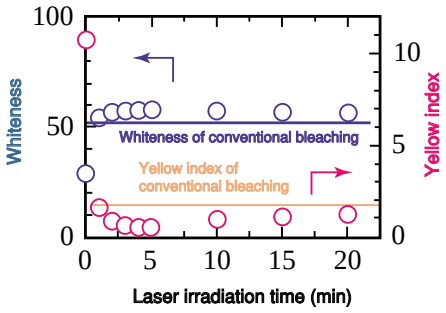
Environmentally-Friendly Bleaching of Fabrics

- Halogen-Free Laser Bleaching -

Bleaching of cotton cloths is now conducted by using halogenated oxidizing reagents at ca. 95 °C for a long time. We have developed a halogen-free bleaching process by using a combination of aqueous solutions of sodium borohydride and laser irradiation at room temperature. Whiteness and yellow index obtained by our process (1-min laser treatment at room temperature) were comparable to those of conventional processes. This process can be applied to the bleaching of other natural fabrics and pulps. Further improvement of the process is now under way to establish a more environmentally friendly and energy conserving bleaching process.



Whiteness and yellow index vs. laser irradiation time

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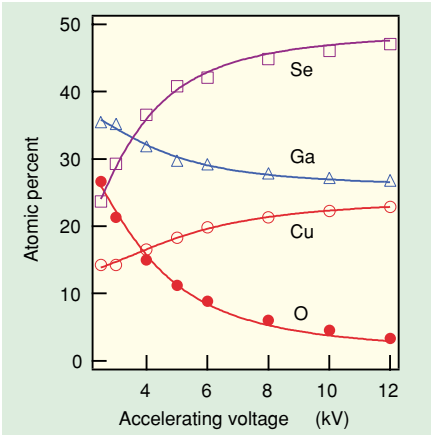
Energy Science & Technology

Aiming for High Efficiency Thin Film Solar Cells

- Analysis of Single Crystal Films Leads to Novel Growth Processes -

It is essential to increase the photoelectric conversion efficiency of solar cells so that cell areas can be minimized and in turn production costs can be reduced. An excellent candidate material for high efficiency cells is $Cu(InGa)Se_2$ that is $CuInSe_2$ alloyed with Ga to match the spectral response of the finished solar cell to the sun. The optimization of $Cu(InGa)Se_2$ is not yet complete, however, research on materials such as $CuGaSe_2$ has progressed. Our recent findings regarding single crystal thin film growth and their characterization are presented; post growth annealing of Cu-Ga-Se precursor films was found to result in the segregation of a gallium oxide surface phase leaving stoichiometric $CuGaSe_2$. This suggests a possible technique for low-cost manufacture of a cell with a built-in junction.



Composition change in depth of annealed gallium-excess film (EPMA accelerating voltage dependence)

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