Novel Mass Spectrometric Technology for Biological and Environmental Fields

We have successfully developed a novel matrix-free soft ionization mass spectrometry technique. In this technique, by irradiating laser shots on the sample simply deposited on germanium quantum dots, mass spectra can be easily observed without obstructive peaks. So far, highly sensitive analysis at 10^{-16} mol level for peptides and analysis of brominated flame-retardants have been demonstrated. This technique is further applicable for wide range of samples not only biomaterials such as proteins, peptides and oligosaccharaides, but also industrial materials such as synthetic polymers and additives.

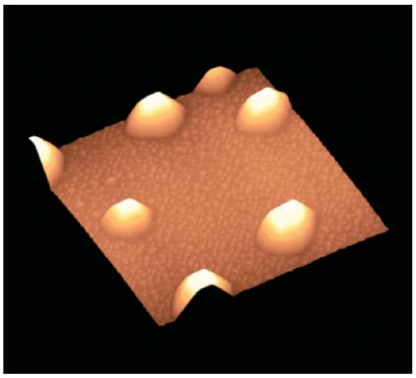

Figure : Photograph of germanium nanodot structure.

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Development of high V_{oc} $Cu(In,Ga)Se_2$ solar cells

A novel technique to improve CIGSe solar cell performance was developed. Introduction of water vapor to a vacuum-deposition chamber reduces defects in CIGSe thin films. Open circuit voltage (V_{oc}) and short circuit current density (J_{sc}) of the films increased as a result. A solar cell with a wide-gap (1.3 eV) CIGSe film gave 18.1% efficiency, V_{oc} of 0.744V, J_{sc} of 32.4 mA/cm^2 and fill factor of 0.752. The novel technique would lead to development of practical large area and/or flexible CIGSe solar cells.

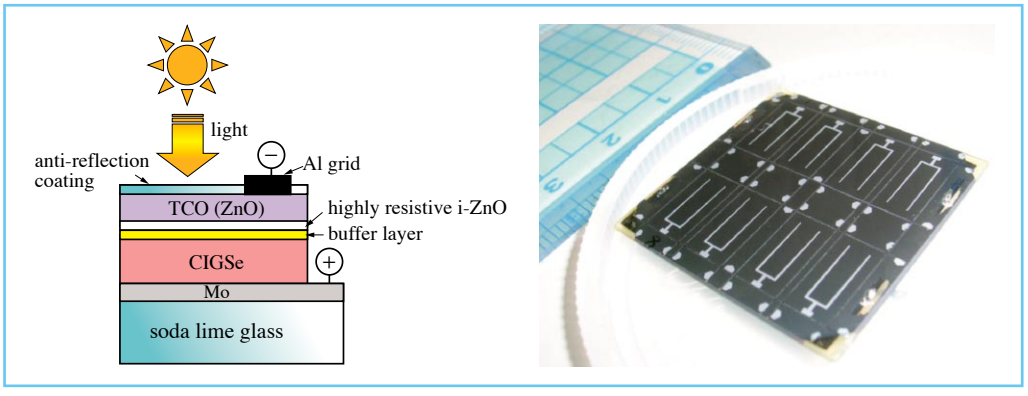

Figure : Schematic illustration of the CIGSe solar cell structure and a device sample.

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