New evaluation method for grain boundaries of organic transistors

Promoting the researches of flexible electronic devices

We have developed a method to evaluate the grain boundaries in organic thin-film transistors (OTFTs) based on electron spin resonance (ESR) analysis. Recently, OTFTs are attracting world-wide interest because of their applications in flexible, light-weight and large-area electronic devices. So far, grain boundary is regarded as one of the bottlenecks for the device performance, but it was difficult to evaluate by conventional electric measurements. Our method utilizes electron spins as a probe to the movement of carriers (electrons or holes). We evaluate the potential barrier height of the grain boundaries by analyzing the anisotropy and the motional narrowing effect of ESR spectra.

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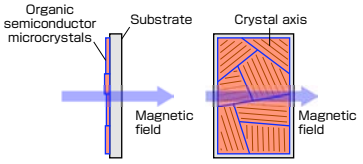
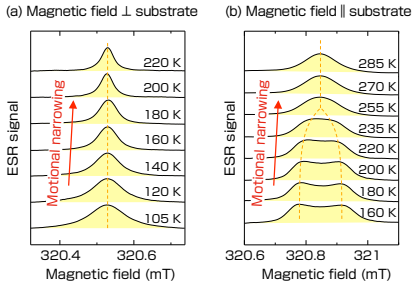


Schematics of the magnetic field perpendicular (left) and parallel (right) to the substrate



ESR spectra at the magnetic field perpendicular (left) and parallel (right) to the substrate

Cesium adsorption by Prussian blue nanoparticles

Utilized for decontamination of radioactive Cs contaminated ash

We have developed a cesium (Cs) adsorbent with high adsorption efficiency based on our technology of Prussian blue nanoparticles synthesis. Prussian blue is known as a good Cs adsorbent with its high adsorption efficiency and selectivity for Cs cations. By decreasing the size of the particles of Prussian blue, the Cs adsorption property is further improved. We have also developed the decontamination method of Cs contaminated ash with the combination of Cs extraction by ash washing and the use of the Prussian blue nanoparticle adsorbent. For the Cs adsorption from the extraction solution, the efficiency of the new adsorbent is 67-1400 times better than zeolite. We conduct the R&D for the Cs decontamination plant for various contaminated wastes such as water, ash, and soil in collaboration with various companies.

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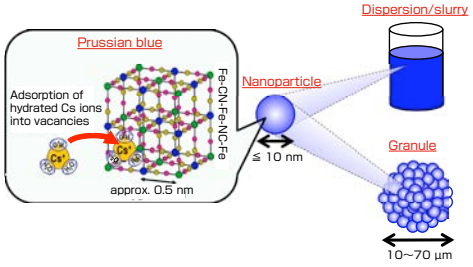
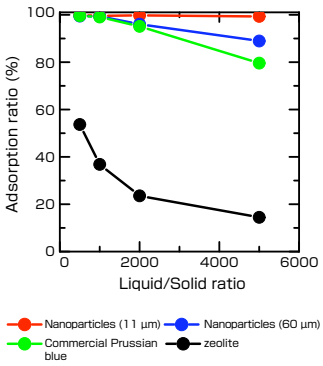


Schematic view of Cs adsorbent with Prussian blue nanoparticles



Adsorption properties of non-radioactive Cs from ash-washing water