Tuning of Color Chromaticity of Light Emission from ZnSe Films Grown on a GaAs Substrate by Atomic Layer Epitaxy

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Monocrystalline films of sphalerite-type ZnSe were grown on GaAs(100) substrates from elemental Zn and Se precursors by atomic layer epitaxy in a gas flow system. Due to color mixing of band edge and deep defect-related emissions these layers emit intensive white light. Cathodoluminescence (CL) and depth-profiling CL investigations were performed to evaluate emission properties. Depth-profiling CL indicates that a bright blue “edge” emission, observed up to room temperature, comes from upper (surface close) parts of ZnSe films and that its intensity increases with increasing thickness of epilayers. Depth profiling CL indicates also that green and red emissions mostly come from disordered regions of the films, close to the ZnSe/GaAs interface.

In further experiments we concentrated on optimization of emission color and temperature. We tested possibility of tuning of chromaticity coordinates and of color temperature of the emission. We found that the chromaticity parameters (color perception) can be tuned by either regulating the appropriate accelerating voltage of electrons or current density of primary electrons in CL investigations.

These properties of ZnSe films make them suitable for some practical applications as white light sources.

This work was partly supported by grant no. 1 P03B 015 29 of MElN granted for the years 2005-2008.