Treatise

Carrier-induced ferromagnetic order in the narrow gap III-V magnetic alloy semiconductor (In,Mn) Sb,

Physica E, Vol. 20, No. 3-4, pp. 333-337,2004.
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InSb has the narrowest band gap in III-V compound semiconductors, and exhibits interesting characteristics and applications associated with its band structure. In this work, we are concerned with incorporation of a large amount of the magnetic element Mn in InSb. We are interested in studying the s,p-d exchange interaction in this narrow gap system. With s,p-d exchange interaction and band mixing, an alloy semiconductor InMnSb may offer a unique device application that can only be realized by the spin degree of freedom. Fabrication and physical properties of alloy semiconductors p-InMnSb and n-InMnSb epitaxial films with Mn contents up to 10%, were studied with the aim to seek for the phenomena induced by the spin exchange interaction between hole carriers and Mn spins. For p-type samples with Mn density of Mn_{eff} = 4.5×10^{20} cm^{-3} and hole density of p = 1.1×10^{20} cm^{-3}, carrier induced ferromagnetic order with the Curie temperature of 20 K was observed. The sign of the anomalous Hall coefficient was found to be negative. Tellurium doped n-type samples (electron density n = 8.6×10^{18} cm^{-3}) with the net Mn contents of 10% were found to be paramagnetic.

Progressive early decision of speech recognition results by comparing most likely word sequences

Systems and Computers in Japan, Vol. 34, No. 14, pp. 73-82, 2003
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This paper describes a method to make an early decision on speech recognition results and eliminate the disadvantage of multiple-pass decoders that delay a decision until the end of an utterance. The most likely word sequence determined at the end of an utterance gives an optimal recognition result in continuous speech recognition for the entire utterance. However, depending on the application, the delay from the utterance to the determination of the recognition result may pose a practical problem, and progressive early decision of recognition results during an utterance becomes necessary. Thus, a scheme for progressive early decision of recognition results by successively comparing the most likely word sequences during an utterance with the past most likely word sequences is proposed and is applied to a one-pass decoder and a two-pass decoder. The proposed scheme attempts to shorten the delays associated with word decisions while limiting the degradation of the recognition rate by controlling the word decision margin and the interval for obtaining the most likely word sequences. In speech recognition experiments on broadcast news, the proposed scheme could progressively decide recognition results with an average word decision delay time of about 0.5 second in a two-pass decoder.

High-definition imaging system based on spatial light modulators with light scattering mode

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Hiroshi Kikuchi, Takanori Fujii, Masahiro Kawakita, Yoshiyuki Hirano, Hideo Fujikake, Fumio Sato, and Kuniharu Takizawa

We have developed a prototype high-definition imaging system using polymer-dispersed liquid crystal light valves, which can modulate unpolarized light with high spatial resolution and exhibit a high optical efficiency, based on the light scattering effect. The new devices were fabricated for each of the red, green and blue channels. Each light valve consists of a nematic liquid crystal in a fine three-dimensional polymer matrix structure, a boron(B)-doped hydrogenated amorphous silicon nitride (a-SiN:H) photoconductive film, a light absorbing film, and a dielectric mirror. Irradiating the B-doped a-SiN:H film on the backside of the valve with the information to be projected orients the liquid crystal such that light reflected at the dielectric mirror is modulated to yield the desired image. No polarizing beamsplitter is required, so the technique does not suffer the optical losses of similar approaches that employ digital micromirror devices or other liquid-crystal light valves. These devices have excellent characteristics, such as a high resolution, with 50 lp/mm as a limiting resolution and greater than 20 lp/mm at the 50% MTF point, and a reflectivity of more than 60%. The completed display yields a resolution of 810 TV lines and a luminous flux of 1900 to 2100 ANSI lm. Measured chromaticity coordinates nearly match the high-definition TV standard. This technology will permit the creation of vibrant images with a super-high contrast and a ultra-high definition by using a laser as a readout light source and a multi-scan input-image source.