strate. Among several possible ways for weighting the grating coupling coefficient, we adopted changing the thickness of cladding layer. By using the holographic exposure technique, the grating mask was produced on a 300 nm-thick cladding layer, part of which was etched to the thickness of 260 nm. The Bragg reflectors with weighted coupling coefficients were successfully fabricated by CHF₃ reactive ion etching. Through SEM observation, the depth of grating was found to be 60 nm. It can be concluded by the calculation that the desired coupling coefficients of 50 cm⁻¹ and 30 cm⁻¹ are obtained for the cladding thicknesses of 300 nm and 260 nm, respectively.


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**CTh84**

**Optically controlled quantum well light modulator**

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In this report, we present preliminary results on a light modulator based on the Quantum Confined Stark Effect (QCSE) but for the first time operating all-optically. The principle of operation of the device is as follows: every period of the heterostructure contains three quantum wells (QWs) designed in such a way that following above band-gap photoexcitation of the photogenerated electrons and holes tend to separate and accumulate in the exterior QWs, creating a local space-charge field having its maximum in the region in between and acting via the QCSE on the exciton resonance a large fraction of the photogenerated electric field by rapid electron transfer from QW1 to QW2. The QW energy levels at the Γ point are denoted by full lines whereas the X point energy level in the AlAs layer by a dotted line.

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**CTh84** Fig. 1. Schematic of one period and photogeneration of electric field by rapid electron transfer from QW1 to QW3. The QW energy levels at the Γ point are denoted by full lines whereas the X point energy level in the AlAs layer by a dotted line.

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**CTh84** Fig. 2. Transmission spectra in the region of the QW2 exciton for various power levels of the coincident Krypton laser. For our focusing conditions, 1 mW corresponds approximately to 0.5 W/cm².

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**CTh85**

**An approach to visual cortex operation: optical neuron model**

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Several works have been published in the last years concerning the modelling and implementation of the visual cortex operation. Most of them present simple neurons with just two different responses, namely inhibitory and excitatory. Some of the different types of visual cortex cells are simulated in these configurations.

Another approach is going to be reported in this paper. Based on a previously reported logic cell structure, the five types of cells present at the vertebrate retina and their intracellular response, as well as their connections with each other, have been simulated. The main scheme of our configuration is shown in Fig. 1. As in the visual cortex, with optical excitation of the order of 20 W/cm². This redshift corresponds for a 150 Å QW to an effective electric field across the active QW of nearly 50 kV/cm, which is sufficient for many device applications. Ongoing work is focusing on optimizing the structure parameters and understanding of the device. The all-optical operation of this modulator in conjunction with the low switch-on power densities are very appealing for applications in the area, for example, of ultrafast parallel image processing.

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**CTh85** Fig. 3. Redshift of the QW2 exciton resonance with increasing power of coincident Krypton laser.

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**CTh85** Fig. 3. Photon Energy (meV) 1600 1450 1400 1425 1440 1460 1480 1500 Laser Power (meV) 1400 1420 1440 1460 1480 1500 Laser Power (meV) 1400 1420 1440 1460 1480 1500 Laser Power (meV)
The first one is a train of light pulses being from the bipolar cells. The studied case, three are the outputs.


CThI85

Ultrafast erasable optical storage in Sb-Rich GeSb films

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Phase change optical storage is the most promising alternative to magnetooptical recording. This technology is an all-optical one and has a much better signal to noise ratio and a simpler reading mechanism that simplifies the optical head. This leads to a decrease in the access time and to make the phase change disks interchangeable with the earlier optical storage products, the CD-ROM and WORM discs. The most significant drawback with phase-change materials has been the need for materials with high-speed crystallization, crystallization triggered by <100 ns laser pulses being usually required.

The aim of this work is to demonstrate that micron-sized bits can be recorded with 12 ns in Sb-rich GeSb films. It will be also shown that reversible phase changes (amorphous $\rightarrow$ crystalline) of the photochromic GeSb$_2$Sb$_{2}$ films are used in real-time holographic recording. The bR film is embedded in acrylamide filling a glass cell. Its size is 1 cm x 1 cm x 500 jxm and an all-trans $\rightarrow$ all-cis transition bR$_{570}$ is used for holographic recording.

CThI86

Ultrafast erasable optical storage in Sb-Rich GeSb films

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Phase change optical storage is the most promising alternative to magnetooptical recording. This technology is an all-optical one and has a much better signal to noise ratio and a simpler reading mechanism that simplifies the optical head. This leads to a decrease in the access time and to make the phase change disks interexchangeable with the earlier optical storage products, the CD-ROM and WORM discs. The most significant drawback with phase-change materials has been the need for materials with high-speed crystallization, crystallization triggered by <100 ns laser pulses being usually required.

The aim of this work is to demonstrate that micron-sized bits can be recorded with 12 ns in Sb-rich GeSb films. It will be also shown that reversible phase changes (amorphous $\rightarrow$ crystalline) of the photochromic GeSb$_2$Sb$_{2}$ films are used in real-time holographic recording. The bR film is embedded in acrylamide filling a glass cell. Its size is 1 cm x 1 cm x 500 jxm and an all-trans $\rightarrow$ all-cis transition bR$_{570}$ is used for holographic recording.

CThI87

Erasable zone plate in bacteriorhodopsin film for photonic switching

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The photochromic protein bacteriorhodopsin (bR), which is related to the human visual pigment, is found in the purple membrane of Halobacterium halobium in two-dimensional crystallized form. The absorption of a visible photon by bR triggers a photocycle as shown in Fig. 1. Both the forward and reverse photoreactions produce stable products in less than 3 picoseconds at 77 K. Its photochromic properties, i.e., the light-driven reversible color changes, are used in real-time holographic recording.

Figure 2 shows schematic diagram of the principal components of an erasable optical storage medium of a bR based photonic switching. The bR film is embedded in acrylamide filling a glass cell. Its size is 1 cm x 1 cm x 500 jxm and an all-trans $\rightarrow$ all-cis transition bR$_{570}$ is used for holographic recording. The bR film is embedded in acrylamide filling a glass cell. Its size is 1 cm x 1 cm x 500 jxm and an all-trans $\rightarrow$ all-cis transition bR$_{570}$ is used for holographic recording.

CThI87

Fig. 1. Scheme of the photochemical and thermal conversions of bR. The photointermediates are abbreviated by single letters. Index numbers indicate the absorption maxima. In this case the photochemical transition $bR \rightarrow M$ is used for hologram formation.