Polarized light emission find wide applications in particularly in liquid crystal displays and different nanophotonic devices [1]. Therefore, the obtaining polarized light emission devices is of great scientific and practical interest.

Gold nanorods (AuNRs) are of current interest because of their anisotropic shape and unique optical properties. The presence of two plasmon (transverse and tunable longitudinal) bands with high absorption coefficients and good photostability determine the prospects of their application for the production of polarizing filters [2]. Polarized light with the electric field oriented parallel or perpendicular to the AuNRs can excite the longitudinal or the transverse surface plasmon band.

The aim of this work was to fabricate the polarized film containing gold nanorods and demonstrate its polarization-dependent optical properties.

old nanorods were synthesized via seed-mediated growth method [3]. The polarization film was prepared by adding gold nanorods to a 5% poly(vinyl alcohol) (PVA) solution. The film was stretched in 4 times at 30 °C.

Figure 1a demonstrate TEM image of synthesized AuNRs. Figure 1b shows UV-vis-NIR spectra of non-stretched AuNR-PVA film and stretched film for 0° and 90° polarization angles. The non-stretched film has two extinction peaks irrespective of the light polarization directions. While the stretched AuNR-PVA film has only one extinction peak upon each polarized excitation, which corresponds to the longitudinal at 0° and transverse at 90° bands of AuNRs.

Fig. 1. a) TEM image of AuNRs; b) UV-vis-NIR spectra of non-stretched AuNR-PVA film and stretched film for 0° and 90° polarization angles.