The thesis is devoted to a possible implementation of a new concept of electronics, the so-called valley-tronics, on an experimental optical setup. The aim is the construction of this setup that enables the study of the generation and detection of anisotropic distribution of electrons in conduction band of diamond by means of interaction with ultrashort laser pulses. After understanding the topic, an optical setup based on an extended pump and probe method is assembled. The first pulse excites the electron population. A second pulse arriving with a given time delay accelerates the electrons and generates an anisotropic population in the conduction band. The generated anisotropy is measured by the third, probe pulse, with which the polarization anisotropy of the transient absorption is detected. As a part of the thesis, preliminary measurements are evaluated and the dependence of the relaxation time of valley polarization in diamond on the setup parameters is interpreted. This valley polarization could be used in the aforementioned valley-tronics, in which information would not be carried by charge, but by the electron valley number.