Photoluminescence (PL) is being used as non-destructive measurement of optical properties of solids. Amongst measured properties is particularly structure of energetical levels of materials, but we can also deduce structure of material or its additives. In theoretical part of this thesis we deal with theory of photoluminescence and photoluminescence spectroscopy, followed by sections dedicated to carbon nanodots, semiconductor core-shell nanodots, nanodots of transition metal dichalcogenides and bulk crystal of ReS_2 . In experimental section we describe devices and setups used for measuring spectra of photoluminescence, followed by descriptions of measured samples. In section of results we show measured PL spectra of samples and PL spectra depending on various parameters, e.g. excitation wavelength or sample concentration. These spectra are subsequently interpreted and based on them are deduced the properties of samples.