Abstract: Dye-sensitized solar cells (DSSC) are promising low-cost molecular photovoltaic devices that have a good chance to become a competitor for solar cells based on technology of p-n junction. One of the key components of DSSC is a dye, which is responsible for the capture of light. The main goal of this bachelor thesis is to compare adsorption properties of bacteriochlorophyll c (*BChl c*) and its modified version referred as bacteriochlorophyllide c (*BChlide c*) on titanium dioxide (TiO_2). In the experimental part of this work interaction of these two sensitizing dyes with TiO_2 were investigated by several different methods, including absorption spectroscopy and measuring photo-induced current and current-voltage characteristics of the fabricated DSSC. It has been shown, that *BChlide c* adsorbs better on the TiO_2 layer presumably due to the presence of a carboxylate group. Also the performance of the DSSC based on *BChlide c* was better than with *BChl c*.