

Dynamic development of civilization caused by dawn of information era implicates growing need of new technologies. Prompted by increasing environmental awareness, scientists seek for alternative sources of energy including solar cells and more efficient electroluminescent materials. It is all about finding molecules that produces energy by absorbing light or molecules emitting light by inducing electric current. Many easily available dyes that convert solar energy to electricity do not meet our needs completely, because they are not stable enough. Second major problem is low efficiency of light-bulbs used in our homes. Only 5% of energy is converted to light and 95% is wasted as a heat. Hope lies in OLED (Organic Light Emitting Diodes) technology, which can be found in smartphones displays. There is need for functional dyes that emit blue, green and red light in order to have full spectrum of colors in such displays. Commercially available blue emitters are still not good enough for wide usage, because they are not stable enough and they have too short lifespan. Scientists are still seeking for new functional dyes, which could emit blue light for over 20000 hours.

The main objective of this project is to synthesize novel compounds, analogues of polycyclic aromatic hydrocarbons. They will possess suitable photophysical and electrochemical properties, and consequently they could be applied as organic molecules in OLEDs or as a platforms in dye-sensitized solar cells. I plan to utilize two synthetic methodologies that allow formation of new carbon-carbon bonds in order to achieve this goal. Photophysical and electrochemical properties of obtained dyes will be thoroughly studied. Important factor which will be investigated is so called light purity. This parameter is essential for dyes which are applied in organic light emitting diodes.