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During the dissertation I have managed to prepare various compounds of phthalocyanine (Pc) structures and measure their production of singlet oxygen. The synthesis of Pc is not overly problematic, however complications arise during purification. Phthalocyanines are known for their instability in visible light spectrum and their aggregation in more concentrated solutions. The singlet oxygen quantum yield is usually low at the aggregates, thus further work is limited. The aim of my work was to create new Pcs with both increased solubility and functional groups suitable for conjugation with biomolecules.

First experiments were performed with silicon complex of Pc (SiPc). However, synthesis of axially substituted SiPc was not successful. Similar compounds with peripheral alkylsulphanyl substitution were also not obtained. These compounds disintegrated during synthesis. Another method that I have tried to insert a central aluminium atom into a Pc platform that was soluble into common organic solvents. Not all peripheral substituents were suitable (**5**, **6**). Even by this method I haven't achieved satisfactory reaction yields.

We have then turned our attention to zinc and magnesium complexes of Pc (ZnPc, MgPc). These synthesis methods are already known. Their reaction conditions are less aggressive. We have studied the influence of substituent on shift in Q band, the production of singlet oxygen and aggregation. Peripheral substitution should ensure water solubility, required for cell testing.

Preparation of compounds with peripheral sulphur bound substituents resulted in better quantum yields. The singlet oxygen quantum yield (Φ_{Δ}) was measured by the method of decomposition of DPBF in pyridine. The singlet oxygen production of ZnPc was twice as high as that of MgPc. The solution of (**9**, **10**, **11**) resulted in very low quantum yield. During the studies of peripheral substituent influence on prevention of aggregation and increase of the solubility the bulky substituents were found more effective than the long aliphatic chains.