

# DESIGN AND SYNTHESIS OF ORGANIC NONLINEAR OPTICAL MATERIALS

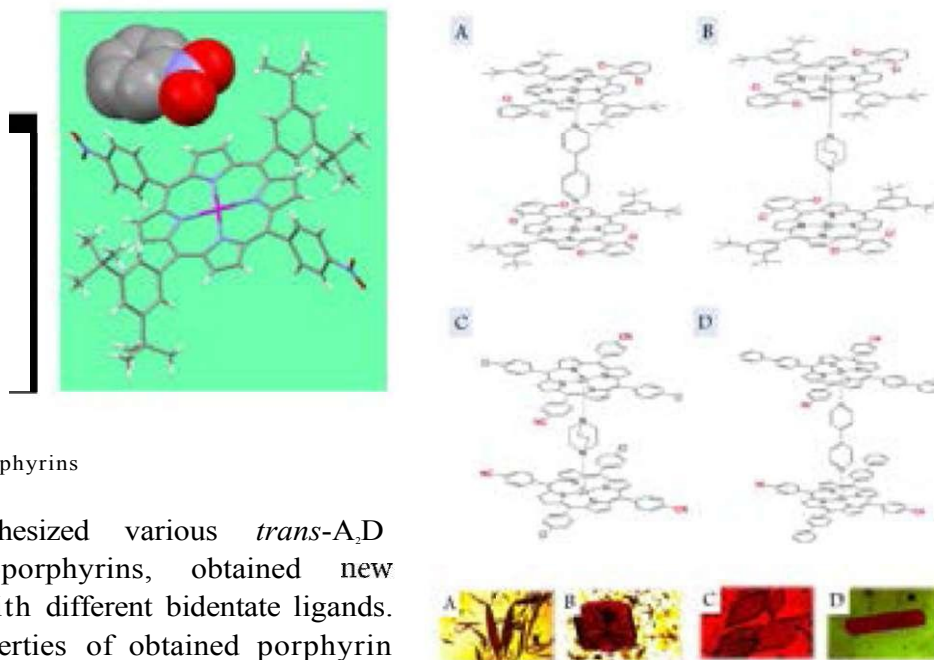
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**Introduction.** Following the development of the idea of octupolar molecules as nonlinear optical materials a variety of compounds have been reported. *Trans*-porphyrins have a great potential to self-order into octupolar symmetry. Nonlinear optical properties can be tuned by using strong donor-acceptor groups in porphyrins as well as extension of conjugation. Here we report the syntheses of *trans*-A<sub>2</sub>D<sub>2</sub>-porphyrins and their dimerization into cubic octupoles by organic bidentate ligands.

**Materials and methods.** *Trans*-porphyrins were synthesized by Lindsey Method [1]. Different aldehydes were reacted with pyrrole to synthesize dipyrromethanes, an intermediate product. Electron deficient nitrophenyl and cyanophenyl groups are used in the synthesis of dipyrromethanes. Then, these dipyrromethanes reacted with various types of aldehydes to give *trans*-porphyrins. Zinc metal insertion accomplished by refluxing zinc acetate and corresponding *trans*-porphyrin in DMF. Synthesized compounds were characterized by <sup>1</sup>H-NMR and UV-Vis spectrometer. Metallated porphyrins were mixed together with bidentate ligands (pyrazine, DABCO, and 4,4-bipyridyl) to form porphyrin dimers.

**Results and discussion.** Four different dimers and two crystal structures of synthesized *trans*-porphyrins obtained with bidentate ligands are shown in Figure 1. Various functional groups are used to tune the nonlinear optical properties and to influence the conformational rotation of dimers. Crystal structures of other *trans*-porphyrins are being obtained and nonlinear activity of noncentrosymmetric dimers will be measured.



**Figure 1.** Dimers and crystal structures of synthesized *trans*-porphyrins

**Conclusion.** We synthesized various *trans*-A<sub>2</sub>D<sub>2</sub> porphyrins and metallo-porphyrins, obtained new dimers and their crystals with different bidentate ligands. The nonlinear optical properties of obtained porphyrin complexes will be analyzed.

## Acknowledgements

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## References.

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