ABSTRACT

of the doctoral dissertation entitled: „*Preparation and characterization of thin films containing zinc and aluminum compounds with 8-hydroxyquinoline and its derivatives for applications in optoelectronics*"

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Thin-film structures play an increasingly important role in everyday life. The thickness of thin layers strongly influences their optical properties (e.g. absorption, transparency, light emission efficiency), surface properties (surface topography), and electrical properties (conduction, charge transport) and their final application. Their production technology depends on, for example, the type of material used or the purity of the layer. Thin-film structures based on organic materials are gaining increasing application potential, opening new opportunities for the development of optoelectronics. Their important advantage is, among others, the almost unlimited possibility of changing their physicochemical properties by designing the appropriate chemical structure. Organic materials enable the production of organic light-emitting diodes (OLED) or organic solar cells. Metalloquinoline compounds may turn out attractive for these applications. OLEDs based on metalloquinolates have been extensively studied in recent years and are slowly starting to be used in commercial devices. The metal complexes can be dispersed in polymers or covalently attached to the polymer backbone, thereby forming solution processable materials. However, fabricating devices using these materials as electron transport and emission layers still remains a challenge for researchers.

The main objective of this doctoral dissertation is to develop a procedure for the preparation and to investigate the photophysical properties of thin organic layers containing tris(8-hydroxyquinoline) aluminum (Alq_3), bis(8-hydroxyquinoline) zinc (Znq_2) and newly synthesized metalloquinolines, i.e. bis(8-hydroxyquinoline) zinc with a styryl group (ZnStq_R, R = H, Cl or OCH_3) dispersed in poly(N-vinylcarbazole), i.e. a conducting polymer, which was used as a polymer matrix, and then to assess the possibility of using these layers in OLED structures. Additionally, hybrid organic-inorganic layers of ZnStq_R with zinc oxide (ZnO) were produced. The effect of ZnO doping on the luminescent properties and morphology of the layers was analyzed for their future application in OLEDs.

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