Abstract

In this work, the advantage of surface modification techniques was exploited to create new hybrid materials and to develop new highly prospective coating techniques for optoelectronic applications. Generally, surface functionalization techniques provide a valuable tool for the improvement of material characteristics with respect to specific applications or for the combination of different material properties.

The first part of this work describes the synthesis of new hybrid materials. The surface functionalization of gold and silica nanoparticles with organic hole-conducting ligands shall give access to the implementation of inorganic nanoparticles with promising properties in optoelectronic devices. Therefore, the hole-conducting shell not only enables the miscibility with other active organic materials, but ensures (semi)conducting properties of the hybrid materials. The electrical properties of the ligand molecules were modified by shifting the energies of the molecular orbitals due to the introduction of different side groups to the conjugated system. Moreover, the prospective application of the synthesized hole-conducting ligands as modification of the anode in organic light-emitting devices is presented.

In the second part of this thesis, surface modification techniques were used to enable a homogenous coating of 3-dimensional surfaces with oxetane-functionalized, active optoelectronic materials. This approach shall give access to solution-processed fabrication of organic light-emitting diodes (OLEDs) on various shaped 3-dimensional surfaces. Based on self-assembling processes of small molecules and polymeric materials, surfaces were functionalized with a thin initiator layer. This initiator layer enabled the surface-induced crosslinking of oxetane-containing polymers on the surface, giving rise to conformally crosslinked, thus homogeneous, polymer coatings. Parameters and compositions of the initiator layers were investigated in detail. Furthermore, the application of this new surface-induced crosslinking processes was demonstrated on the fabrication of organic light-emitting devices. These devices showed comparable device performances to reference devices with identical layer stacks, but fabricated by common coating techniques. However, the new process offers the expanded applicability to irregular and shaped surfaces.