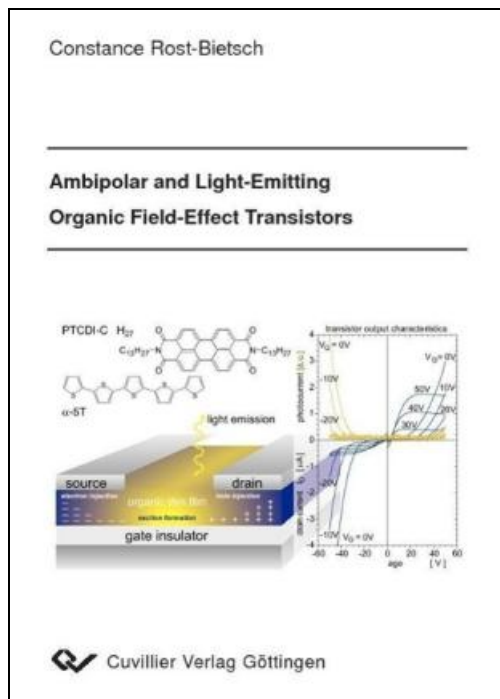


## Ambipolar and Light-Emitting Organic Field-Effect Transistors



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## AMBIPOLAR AND LIGHT-EMITTING ORGANIC FIELD-EFFECT TRANSISTORS



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Cuvillier Verlag Aug 2005, 2005. Taschenbuch. Condition: Neu. Neuware - Ziel dieser Arbeit war die Herstellung und Charakterisierung eines lichtemittierenden ambipolaren organischen Feldeffekttransistors (OFET). In der Literatur wurden lichtemittierende ambipolare Feldeffekttransistoren auf der Basis organischer Moleküle, die von Interesse für neue elektro-optische Bauelemente sind, bisher noch nicht beschrieben. Für die Realisierung eines lichtemittierenden ambipolaren OFETs wurden drei verschiedene Strategien verfolgt: Zum einen wurden konventionelle Einschichtstrukturen auf ihre Elektrolumineszenzeigenschaften hin untersucht. Desweiteren wurden Zweischichtstrukturen auf der Basis eines Elektronen- und eines Löchertransportmaterials hergestellt. Schließlich wurde ein völlig neues Konzept basierend auf koverdampften, d.h. gemischten Filmen bestehend aus Löcher- und Elektronentransportmaterial, realisiert. Die Einschichtstrukturen für sich waren zwar emittierend, doch ist aufgrund der unipolaren Transporteigenschaften der organischen Materialien die Lichtemission auf einen Bereich an einem Kontakt beschränkt. Im Gegensatz dazu wurde an den Zweischichtstrukturen eine ambipolare Transportcharakteristik gemessen, jedoch keine Elektrolumineszenz beobachtet. Schließlich konnte über das neue Konzept der koverdampften Bulk-Heterostruktur erstmals Elektrolumineszenz in einem ambipolaren OFET beobachtet werden. The goal of this thesis was the fabrication and characterization of a light-emitting ambipolar organic field-effect transistor (OFET). In the literature, light-emitting ambipolar field-effect transistors (FET) based on small molecules, which are of interest for novel electro-optical devices, have not yet been described. For the realization of such a light-emitting ambipolar OFET, three different strategies were pursued: Firstly, conventional single-layer OFETs were investigated in terms of their electroluminescent properties. Secondly, bilayer heterostructures based on an electron- and a hole-transport material were prepared. Thirdly, a novel concept based on coevaporated, i.e. mixed films consisting of an electron- and a hole-transport material, has been realized. Although the single-layer structures were light-emitting, the unipolar transport properties of the organic materials restrict light emission to a region close to one contact. In contrast, in bilayer heterostructures an ambipolar transport characteristics was measured, but no electroluminescence (EL)...



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