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(54) **Organisches, elektrolumineszentes Bauteil**

Organic electroluminescent device

Dispositif électroluminescent organique

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(56) Entgegenhaltungen:
US-A- 5 128 587

- **INTERNATIONAL CONFERENCE, RARE EARTHS '92, KYOTO, JAPAN, 1-5 JUNE 1992, Bd. 192, Nr. 1-2, ISSN 0925-8388, JOURNAL OF ALLOYS AND COMPOUNDS, 23 FEB. 1993, SWITZERLAND, Seiten 30-33, KIDO J ET AL 'Organic electroluminescent devices using lanthanide complexes'**
- **INTERNATIONAL CONFERENCE ON SCIENCE AND TECHNOLOGY OF SYNTHETIC METALS (ICSM '94), SEOUL, SOUTH KOREA, 24-29 JULY 1994, Bd. 71, Nr. 1-3, ISSN 0379-6779, SWITZERLAND, Seiten 2099-2100, TAKADA N ET AL 'Strongly-directed emission from microcavity structure in electroluminescent diodes with europium complex as an emitter'**
- **PATENT ABSTRACTS OF JAPAN Bd. 016, Nr. 120 (E-1182) 26 März 1992 & JP-A-03 289089 (MITSUI TOATSU CHEM INC) 19 Dezember 1991**
- **APPLIED PHYSICS LETTERS, 24 OCT. 1994, USA, Bd. 65, Nr. 17, ISSN 0003-6951, Seiten 2124-2126, KIDO J ET AL 'Bright red light-emitting organic electroluminescent devices having a europium complex as an emitter'**

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Claims

1. An organic electroluminescent component with a layer structure comprising

- 5 a) a substrate layer,
 b) a first transparent electrode layer,
 c) one or several functional optoelectronic layer(s) with
- 10 c1) possibly, one or several p-type organic materials with one or several singlet states and one or several triplet states,
 c2) a luminescent material with one or several complexes of a rare earth metal ion with organic ligands, in which the rare earth metal ion has an emitting state and the organic ligands have one or several singlet states and one or several triplet states, and
 c3) one or several n-type organic materials with one or several singlet states and one or several triplet states, and
- 15 d) a second electrode,

20 characterized in that the triplet state of lowest energy of the ligands is lower than the triplet states of lowest energy of the n-type and/or the p-type organic materials but higher than above the emitting state of the rare earth metal ion.

2. An organic electroluminescent component as claimed in Claim 1, characterized in that a p-type organic material and the luminescent material are present in a first, homogeneous layer, and an n-type organic material is present in a second layer, while the lowest triplet state of the p-type organic material is lower than that of the n-type material.
- 25 3. An organic electroluminescent component as claimed in Claim 1, characterized in that a p-type organic material is contained in a first layer and an n-type material and the luminescent material are contained in a second, homogeneous layer, while the lowest triplet state of the n-type organic material is lower than that of the p-type material.
- 30 4. An organic electroluminescent component as claimed in Claim 1, characterized in that a p-type material is present together with the luminescent material in a first homogenous layer, and an n-type material together with the luminescent material in a second homogenous layer.
- 35 5. An organic electroluminescent component as claimed in Claim 1, characterized in that one or several p-type materials, the electroluminescent material, and one or several n-type materials are contained in one homogeneous layer, while the redox potentials of the n- and p-type materials are greater than those of the electroluminescent material.
- 40 6. An organic electroluminescent component as claimed in Claim 1, characterized in that one or several p-type organic materials, one or several n-type organic materials, and the electro luminescent material are each arranged in a separate layer, while the layer with the electro luminescent material lies between the layer with the p-type material(s) and that with the n-type material(s).
- 45 7. An organic electroluminescent component as claimed in Claims 1 to 6, characterized in that the p-type organic materials are a molecule-doped organic polymer, a semiconducting conjugated polymer, an intrinsically conducting organic polymer, or a p-type organic monomer, or mixtures thereof.
- 50 8. An organic electroluminescent component as claimed in Claims 1 to 6, characterized in that the p-type organic material is formed by the organic ligands of the rare earth metal ion.
9. An organic electroluminescent component as claimed in Claims 1 to 8, characterized in that the n-type organic materials are a molecule-doped organic polymer, an intrinsically conducting organic polymer, or an n-type organic monomer, or mixtures thereof.
- 55 10. An organic electroluminescent component as claimed in Claims 1 to 9, characterized in that the ligands of the rare earth metal ions are chelating oxygen, sulphur, or nitrogen ligands.