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器件驱动与控制

有机电致发光器件薄膜封装研究进展

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摘要: 有机电致发光器件(OLEDs)对水汽和氧气非常敏感,渗入OLEDs内的水汽和氧气会腐蚀有机功能层及电极材料,严重影响器件寿命。文中根据OLEDs对封装材料的要求,分析了目前最有前景的OLEDs封装技术——薄膜封装,重点介绍了薄膜封装的分类和研究现状。

关键词: 有机电致发光器件 薄膜封装 老化机制

Research Progress of Thin Film Encapsulation of Organic Light-Emitting Devices

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Abstract: Organic light-emitting devices (OLEDs) are extremely sensitive to vapor and oxygen. The influence of inleakage of vapor and oxygen which can corrode organic functional layer and the electrode material on device's lifetime was serious. Based on the requirements of encapsulation materials, this paper analyzes the most promising OLEDs encapsulation technology —thin film encapsulation, which mainly focuses on the classification and research status.

Keywords: OLEDs thin film encapsulation aging mechanisms

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- [1] 刘彭义,唐振方,孙汪典.有机电致发光器件的研究进展及应用前景 [J].暨南大学学报, 2002, 23(2): 66-43.
- [2] 尹盛,刘陈,钟志有.有机电致发光材料的研究现状 [J].化工新型材料, 2003, 31 (1): 1-4.
- [3] 邹德春,程忠英.新一代超薄显示技术-OLED [J].今日电子, 2003, (3): 15-18.
- [4] 黄春辉,李富友,黄维.有机电致发光材料与器件导论 [M].上海:复旦大学出版社, 2005: 65.
- [5] Tang C W, Van Slyke S A, Chen C H. Organic electroluminescent devices with improved stability [J]. *Appl. Phys. Lett.*, 1996, 69(15): 2160-2162.
- [6] Burroughes J H, Bradley D D C, Brown A R, et al. Light-emitting diodes based on conjugated polymers [J]. *Nature*, 1990, 347(11): 539-541.
- [7] 王宏智,王津生,陈君,等.有机电致发光器件封装技术的研究进展 [J].电镀与涂饰, 2007, 26(3): 45-48.
- [8] Ullrich M, Peter B. The electroluminescence of organic materials [J]. *J. Materials Chem.*, 2000, 10: 1471-1507.
- [9] Sutherland D G J, Carlisle J A, Elliker P, et al. Photo-oxidation of electroluminescent polymers studied by core-level photo-absorption spectroscopy [J]. *Appl. Phys. Lett.*, 1996, 68: 2046-2048.
- [10] Lim S F, Ke L, Wang W, et al. Effects of Mg doping on photoelectrical properties of hydrogenated GaN films grown at 380°C [J]. *Appl. Phys. Lett.*, 2001, 78: 2116-2168.
- [11] Sheats J R, Roitman D B. Failure modes in polymer-based light-emitting diodes [J]. *Synthetic Metal*, 1998, 95: 79-85.
- [12] Lee-M D, Mitsuaki O, Amane K, et al. Morphological change in the degradation of Al electrode surfaces of electroluminescent devices by fluorescence microscopy and AFM [J]. *Thin Solid Films*, 1996, 273: 209.
- [13] 李斌,彭玲,潘晓勇,等.有机电致发光器件(OLED)的封装技术研究 [J].元器件制造与材料, 2011, 13(4): 28-30.
- [14] 张方辉,席俭飞,王秀峰,等.硫系玻璃薄膜封装层对OLED寿命的影响 [J].光电器件, 2010, 31(1): 30-33.
- [15] Hiroshi Nakayama, Michihiro Ito. Super H₂O-barrier film using Cat-CVD (HWCVD)-grown SiCN for film-based electronics [J]. *Thin Solid Films*, 519, (2011): 4483-4486.
- [16] Meyer J, Schneidenbach D, Winkler T, et al. Reliable thin film encapsulation for organic light emitting diodes grown by low-temperature atomic layer deposition [J]. *Appl. Phys. Lett.*, 2009, 94 (23): 3305-3307.
- [17] Sun H Y, Lau K M, Lau K C, et al. Fluorocarbon film as cathode protective coating in organic light-emitting devices [J]. *Appl. Phys. Lett.*, 2006, 88 (22): 3503-3505.
- [18] Kim Han-Ki, Kim Myung Soo, Kang Jae-Wook, et al. High-quality thin-?lm passivation by catalyster-enhanced chemical vapor deposition for organic light-emitting diodes [J]. *Appl. Phys. Lett.*, 2007, 90 (1): 3502-3504.
- [19] Wuua D S, Loa W C, Chiang C C, et al. Plasma-deposited silicon oxide barrier films on polyethersulfone substrates: temperature and thickness effects [J]. *Surface & Coatings Technology*, 2005, 19 (7): 253-259.
- [20] Wuua D S, Loa W C, Chiang C C, et al. Water and oxygen permeation of silicon nitride films prepared by plasma-

- enhanced chemical vapor deposition [J]. *Surface & Coatings Technology*, 2005, 19 (8):114-117.
- [21] Jeong J A, Kim H K, Yi M S. Effect of Ag interlayer on the optical and passivation properties of flexible and transparent $\text{Al}_2\text{O}_3/\text{Ag}/\text{Al}_2\text{O}_3$ multilayer [J]. *Appl. Phys. Lett.*, 2008, 93 (3):3301-3303.
- [22] Wong F L, Fung M K, Tao S L, et al. Long-lifetime thin-film encapsulated organic light-emitting diodes [J]. *J. Appl. Phys.*, 2008, 104(1): 4509-4512.
- [23] Liao Y J, Yu F F, Li L, et al. Low-cost and reliable thin film encapsulation for organic light emitting diodes using magnesium fluoride and zinc sulfide [J]. *Thin Solid Films*, 2011, 519(11):2344-2348.
- [24] Kim Gi Heon, Oh Jiyoung, Yang Yong Suk, et al. Encapsulation of organic light-emitting devices by means of photo polymerized polyacrylate films [J]. *Polymer*, 2004, 45(6): 1879-1883.
- [25] Chena C M, Chung M H, Hsieh T E, et al. High Electroluminescent properties of color/luminance tunable organic light emitting diodes and their lifetime enhancement with encapsulation [J]. *Materials Science and Engineering (B)*, 2008, 15 (3): 100-105.
- [26] 叶丹琴, 杨利营, 印寿根. 聚对二甲苯类薄膜用于有机电致发光器件的封装 [J]. 光电子·激光, 2009, 20(1):24-27.
- [27] Granstrom J, Swensen J S, Moon J S, et al. Encapsulation of organic light-emitting devices using a perfluorinated polymer [J]. *Appl. Phys. Lett.*, 2008, 93(19):3304-3306.
- [28] McMahon John. Barix技术带来OLED显示器的性能和应用突破..http://www.eet-china.com/ART_8800323781_480701_TA_5a7ed785.HTM.
- [29] Ghosh A P, Gerenser L J, Jarman C M, et al. Thin-film encapsulation of organic light-emitting devices [J]. *Appl. Phys. Lett.*, 2005, 86(22): 3503-3305.
- [30] Weaver M S, Michalski L A, Rajan K, et al. Organic light-emitting devices with extended operating lifetimes on plastic substrates [J]. *Appl. Phys. Lett.*, 2002, 81 (16):2929-2931.
- [31] Lee Young Gu, Choi Yun-Hyuk, Kee In Seo, et al. Thin-film encapsulation of top-emission organic light-emitting devices with polyurea/ Al_2O_3 hybrid multi-layers [J]. *Organic Electronics*, 2009, 7(15):1352-1355.

本刊中的类似文章

1. 史高飞, 牛红林, 鲁文武, 胡俊涛. MoO_3 作空穴注入层的绿光有机电致发光器件制备及其性能研究[J]. 液晶与显示, 2012,(2): 177-181
2. 梁田静, 张方辉, 丁磊.多层氧化物复合阴极透明OLED器件[J]. 液晶与显示, 2012,27(1): 43-46
3. 姜文龙, 赵雷, 张刚, 刘铁功, 王艳玲, 段羽.基于DSA-ph的高效蓝色有机电致发光器件[J]. 液晶与显示, 2011,26(5): 616-619
4. 张静, 张方辉, 阎洪刚.HAT-CN作为空穴注入层的高效白色荧光有机电致发光二极管[J]. 液晶与显示, 2011,26(4): 490-495
5. 高永慧, 姜文龙, 丁桂英, 从林, 孟昭晖, 欧阳新华, 曾和平.基于NPBX掺杂CzHQZn的黄色有机电致发光器件[J]. 液晶与显示, 2011,26 (1): 44-48
6. 黄涛, 姜文龙, 丁桂英, 汪津, 曾和平.基于BTHQZn的黄色有机电致发光器件[J]. 液晶与显示, 2010,25(5): 684-688
7. 陈柳, 俞宏坤, 曾韡, 彭雅芳.N&K多功能薄膜分析仪在OLED失效分析中的应用[J]. 液晶与显示, 2010,25(4): 582-584
8. 陆君福;张方辉;刘丁菡;蒋谦.多层掺杂白光有机电致发光器件的光谱稳定性[J]. 液晶与显示, 2010,25(3): 370-374
9. 孙军;张玉祥;胡灵峰;张宏科;张春林;杜红梅;何海晓.一种新型Ir(III)配合物磷光材料的电致发光性能[J]. 液晶与显示, 2010,25(3): 360-363
10. 王广德;丁桂英;姜文龙;欧阳新华;曾和平.基于TPAHQZn发光色度稳定的黄色OLED[J]. 液晶与显示, 2009,24(04): 497-501
11. 孔祥朝 张方辉 高淑雅.有机电致发光器件(OLEDs)的薄膜封装的研究进展[J]. 液晶与显示, ,(): 0-0