

用SEM-EDAX技术测定 UF胶在胶合板中的微观分布

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摘要 用带有能谱仪的扫描电子显微镜 (SEM-EDAX) 测定UF胶在胶合板中的微观分布, 讨论了用硫脲作为标志物的可能性。结果表明, 用硫脲代替少量尿素制成的UF胶性能类似于通常的UF胶, SEM-EDAX技术以较高的准确度提供了半定量测量UF胶微观分布的信息。

关键词 UF胶微观分布; 标记物; 扫描电子显微镜-能谱仪; 胶层; 峰背比

1 前言

大量研究表明, 在人造板中, 胶粘剂向木材中的渗透加强了木材之间的胶合强度^[6,7,9,10]。White等^[9]研究得出, 胶粘剂在木材中渗透的深度和被胶合木材之间的断裂韧性 (K_{IC}) 成正比关系; Nearn^[10]对室外用胶合板的研究认为, 只有当胶粘剂渗透到木材细胞壁上时, 板子强度才能满足室外用标准, 因而测定胶粘剂在人造板中的微观分布, 历来是木材科学研究者研究的一项课题。早先的研究采用光学显微镜结合染色的方法观察胶粘剂在人造板中的微观分布^[5,7], 后来电子显微镜技术也被用来观察测定胶粘剂的分布^[3,4,8], 但上述方法仅限于定性分析。

1978年, Saka等^[11]成功地用带有能谱分析仪的扫描电子显微镜 (SEM-EDAX) 技术测定了几种木材和纸浆中的木素分布情况, 后来Bolton等^[1]将此方法用于研究UF胶在刨花板中的微观分布。同其他方法相比, SEM-EDAX技术的优点是可以在高分辨率下完成微区的定量或半定量分析。本文运用这项技术对胶合板中UF胶的分布作一初步研究, 为以后的研究奠定基础。

2 试验材料及方法

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2.1 原料

椴木 (*Tilia amurensis*) 单板: 厚度1.1~1.2mm, 含水率为6%; 胶粘剂制造条件: 甲醛: 尿素 = 1.61: 1, 硫脲素添加量为尿素的5.3%; 制板条件: 三夹板, 涂胶量220g/m² (双面), 温度140±3℃, 时间3min, 压力1.2MPa。作为对比, 实验中压制了不加硫脲素的常规UF胶胶合板, 实验条件同上。

板子压制后, 一部分用于测试胶合强度, 一部分制成5mm×3mm×3mm的小试块用于SEM及SEM-EDAX观察分析。

2.2 试件干燥

将试块放入盛有硅胶的干燥器皿中干燥20天, 以减少试块内水分。

2.3 渗透和包埋

试块在包埋剂spurr树脂中真空浸渍2小时, 然后在80℃下聚合8小时后得到包埋块。

2.4 修面

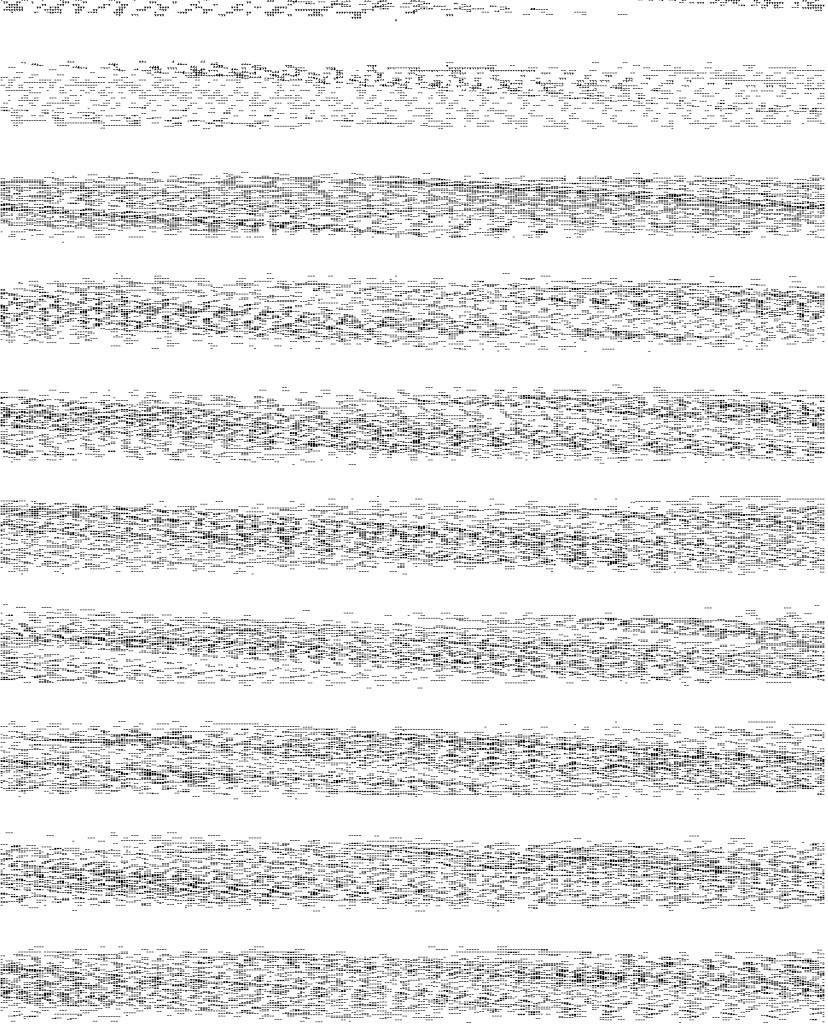
用超薄切片机 (LKB-V型) 玻璃刀对包埋块的被观察面进行整修, 用光镜检查效果。

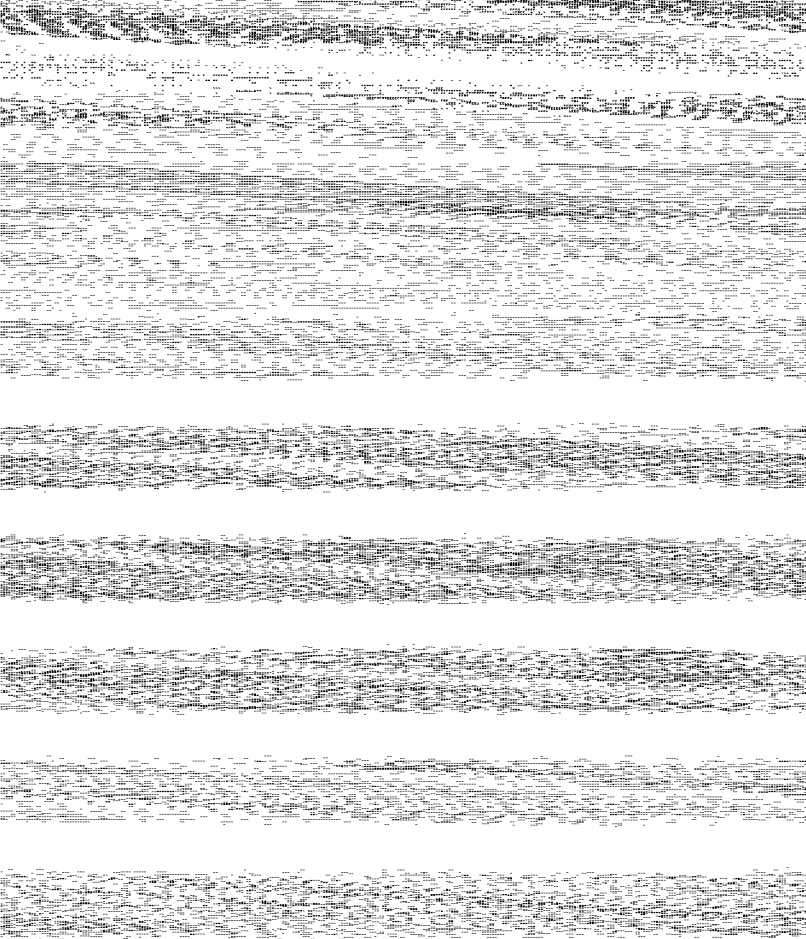
2.5 喷碳

将包埋块置于真空喷镀仪上进行喷碳。

2.6 SEM-EDAX分析

仪器: 扫描电镜SX-40 (日本明石公司产品); X射线能谱仪EDAX PV-9100。





会更好^[12], 这有待于进一步研究。

4 结论

通过以上分析, 可以得出以下结论:

4.1 可用硫脲素作为标记物代替少量 尿素制成UF/thiourea胶, 通过SEM-EDAX 探测硫的存在, 从而确知UF胶的存在。

4.2 与单纯的SEM分析技术相比, SEM-EDAX分析技术准确度高, 减少了直观的误差。

4.3 SEM-EDAX分析表明, 胶合板中UF向木材中渗透的距离为2~4个木纤维厚度。

致谢 在制备胶粘剂过程中得到了刘启明副教授的大力协助, 谨致谢忱。

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the recent years. As raw material, poplar PSL was studied. The relationship between hot-pressing parameters of UF bond PSL and its properties was analyzed. Optimum technological parameters were obtained as follows (the thickness of the final products was 15 mm); hot-pressing temperature 145 °C, hot-pressing time 20min; hot-pressing pressure 6.76MPa; final products density 0.60g/cm.

Keywords Poplar; Parallel strand lumber

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A study on the improvement of the quality of hardboard

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Abstract In this article, the combined effect of the fiber-pulp-treatment and hot-pressing on the properties of hardboard were studied. The relation of sizing methods to product quality were also examined. There was close relationship between mat moisture content before resin spreading and resin retention. The solid content of resin used should be controlled according to different mat moisture content.

Keywords Hardboard; Fiber-pulp-treatment; Spreading method; Bending strength; Water absorption

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The microdistribution of UF resin in plywood determined with SEM-EDAX technique

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Abstract The microdistribution of UF resin plywood was determined with scanning electron microscopy coupled with energy dispersive X-ray analysis (SEM-EDAX), and possibility of thiourea as the label was also discussed. The results showed that: the properties of UF resin in which part of urea had been substituted by thiourea were similar to those of commercial UF resin. The SEM-EDAX technique provided semi-quantitative information of UF resin microdistribution with relatively high accuracy.

Keywords Microdistribution of UF resin; Label; SEM-EDAX; Glueline; (P-B)/B ratios