

测试报告

TEST REPORT

产品名称	镀膜钢化玻璃
PRODUCE NAME	<u>Tempered Coated Glass</u>
规格型号	3 • 2 mm
TYPE/MODEL	<u>3.2mm</u>
委托单位	青岛华帝玻璃有限公司
CUSTOMER	<u>Qingdao Vatti Glass Co., Ltd</u>

国家太阳能光 : 检验中心

National Center of Supervision & Inspection of Solar Photovoltaic Products Quality

伏产品质量监

& Inspection of Solar Photovoltaic Products Quality

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国家太阳能光伏产品质量监督检验中心

National Center of Supervision & Inspection on Solar Photovoltaic Products Quality

测试报告

TEST REPORT

产品名称 PRODUCT NAME		镀膜钢化玻璃	规格型号 TYPE/MODEL	3.2mm 3.2mm
		Tempered Coated Glass	商 标 TRADE MARK	—
委托 单位 CUSTOMER	名称 NAME	彩虹集团电子股份有限公司 IRICO GROUP ELECTRONICS CO., LTD	产品等级 GRADE	—
	地址 ADDRESS	陕西省咸阳市彩虹二路光伏玻璃厂 NO. 2 Caihong Road, Xianyang, Shanxi		抽样基数 LOT SIZE
生产单位 MANUFACTURER		彩虹集团电子股份有限公司 IRICO GROUP ELECTRONICS CO., LTD	样品数量 QUANTITY	63 片
		—		63 pcs
抽样地点 SAMPLING LOCATION		—	抽样方法 SAMPLING METHOD	—
		—		—
抽样口期 DATE OF SAMPLING		—	批号/生产日期 LOT NO. /DATE OF PRODUCTION	-/2014. 12. 25
样品接收日期 SAMPLE RECEIVED DATE		2015-01-07	样品状态 CONDITION OF SAMPLE	符合测试要求 The samples are ready for test
测试日期 TESTING PERIOD		2015-01-09~2015-02-26	测试类别 TESTING TYPE	委托测试 Test ordered by the customer
测试依据 TEST REQUESTED/ TEST METHOD		JC/T 2170-2013 《太阳能光伏组件用减反射膜玻璃》 ISO 9050:2003 Glass in building - Determination of light transmittance, solar direct transmittance, total solar energy transmittance, ultraviolet transmittance and related glazing factors Q/CPVT 005-2014 《PCT 加速老化环境试验方法》 ISO 9211-4:2012 Optics and photonics-Optical coatings-Part 4:Specific test methods 委托单位技术要求 JC/T 2170-2013 Anti-reflective coated glass for photovoltaic modules ISO 9050:2003 Glass in building - Determination of light transmittance, solar direct transmittance, total solar energy transmittance, ultraviolet transmittance and related glazing factors Q/CPVT 005-2014 Method for PCT accelerated aging test Refer to ISO 9211-4:2012 Optics and photonics-Optical coatings-Part 4:Specific test methods Technical requirements given by the customer		
测试: 二 『 REVIEWED BY AP 普飢		評 專	皿題 銘	馨)
备注 ADDITIONAL INFORMATION:		委托单位提供生产单位名称和生产日期。 The name of manufacturer and date of production were provided by the customer.		

测试结果

A LIST OF TEST RESULT

序号 NO.	测试项目 TESTING ITEMS	单位 UNIT	技术要求 TECHNICAL REQUIREMENTS	测试结果 TEST RESULTS	单项评价 JUDGEMENT
1	太阳光有效透射比 The effective solar transmittance	—	实测值 Measured value	1#: 91.65% 2#: 91.63% 3#: 91.96% 4#: 93.67% 5#: 93.65% 6#: 93.70%	—
2	耐磨试验 Abrasion resistance test	—	单位面积内 (25 刚 2) 试样载重 250g, 线性摩擦 25 次。 盘验前 3 太阳有效透射比的平均值衰减 W 1% 250g loading per unit area (25mm ²), linear abrasion: 25 times. The average of effective solar transmittance difference between coated glasses and glasses after experiment: W 1%.	7#: 0.95% 8#: 0.92% 9#: 0.93%	P
3	耐洗刷性能 Scrub resistance test	—	按照标准 JC/T 2170-2013/6.7 进行, 质量分数为 0.5% 的洗衣粉溶液, pH 值为 9.5-11.0, 共 400 次循环。 试验前后太阳光有效透射比的平均值衰减 W 1%, 且膜层无明显脱落、剥离、起皱现象。 The test was according to item 6.7 of the standard JC/T 2170-2013. Mass fraction: 0.5%, pH: 9.5-11.0, total number: 400 cycles. The average of effective solar transmittance difference between coated glasses and glasses after experiment: 1%, no shedding, stripping or wrinkling on the coating.	10#: 0.25% 11#: 0.35% 12#: 0.32% 膜层无明显脱落、剥离、起皱现象。 No shedding, stripping or wrinkling on the coating.	P

测试结果

A LIST OF TEST RESULT

序号 NO.	测试项 FI TESTING ITEMS	单位 UNIT	技术要求 TECHNICAL REQUIREMENTS	测试结果 TEST RESULTS	单项评价 JUDGEMENT
4	耐紫外性能 UV Test	—	<p>按照标准 JC/T 2170-2013/6.13 进行。试样的温度范围为 (60±5) °C,样品经 受波长在 280nm 到 385nm 范围的紫外辐照 为 15kWh·m⁻²,其中波长为 280nm 到 320nm 的紫外辐照至少为 5kWh·m⁻² 试验前后太阳光有效透射比的平均值衰减 W1%,且膜层无明显脱落、剥离、起皱现象。</p> <p>The test was according to item 6.13 of the standard JC/T 2170-2013. Make sure that the sample temperature is (60±5) °C. Subject the glasses to a total UV irradiation of 15 kWh·m⁻² in the wavelength range between 280 nm and 385 nm, with at least 5 kWh·m⁻² in the wavelength band between 280 nm and 320 nm. The average of effective solar transmittance difference between coated glasses and glasses after experiment: W 1%, no shedding, stripping or wrinkling on the coating.</p>	<p>13#: 0.30% 14#: 0.29% 15#: 0.25% 膜层无明显脱落、剥离、起皱现象。 No shedding, stripping or wrinkling on the coating.</p>	P
5	耐中性盐雾性能 Neutral salt spray test	—	<p>按照标准 JC/T 2170-2013/6.9 进行。50g/L±5g/L 的 NaCl 溶液, pH 在 6.5-7.2 范围内, 35°C±2°C 的温度下连续喷雾, 测试时间为 96 小时。</p> <p>试验前后太阳光有效透射比的平均值衰减 W 1%,且膜层无明显脱落、剥离、起皱现象。</p> <p>The test was according to item 6.9 of the standard JC/T 2170-2013. 50g/L±5g/L NaCl solution, pH: 6.5~7.2, 35°C ±2°C, 96 hours.</p> <p>The average of effective solar transmittance difference between coated glasses and glasses after experiment: 1%, no shedding, stripping or wrinkling on the coating.</p>	<p>16#: 0.30% 17#: 0.35% 18#: 0.35% 膜层无明显脱落、剥离、起皱现象。 No shedding, stripping or wrinkling on the coating.</p>	P

测试结果

A LIST OF TEST RESULT

序号 NO.	测试项目 TESTING ITEMS	单位 UNIT	技术要求 TECHNICAL REQUIREMENTS	测试结果 TEST RESULTS	单项评价 JUDGEMENT
6	耐热循环性能 Thermal cycling test	—	<p>按照标准 JC/T 2170-2013/6.10 进行。使试样的温度在 $-40^{\circ}\text{C}\pm 2^{\circ}\text{C}$ 和 $85^{\circ}\text{C}\pm 2^{\circ}\text{C}$ 之间循环，循环次数为 200 次。试验前后太阳光有效透射比的平均值衰减 $W 1\%$，且膜层无明显脱落、剥离、起皱现象。</p> <p>The test was according to item 6.10 of the standard JC/T 2170-2013. Temperature cycles from $-40^{\circ}\text{C}\pm 2^{\circ}\text{C}$ to $85^{\circ}\text{C}\pm 2^{\circ}\text{C}$, 200cycles.</p> <p>The average of effective solar transmittance difference between coated glasses and glasses after experiment: $W 1\%$, no shedding, stripping or wrinkling on the coating.</p>	<p>19#: 0.40%</p> <p>20#: 0.40%</p> <p>21#: 0.33% 膜层无明显脱落、剥离、起皱现象。</p> <p>No shedding, stripping or wrinkling on the coating.</p>	P
7	耐湿冻性能 Humidityfreeze Test	—	<p>按照标准 JC/T 2170-2013/6.11 进行。相对湿度：$85\%\pm 5\%$，最高温度 $85^{\circ}\text{C}\pm 2^{\circ}\text{C}$ 降至 $-40^{\circ}\text{C}\pm 2^{\circ}\text{C}$，循环次数为 10 次。试验前后太阳光有效透射比的平均值衰减 $W 1\%$，且膜层无明显脱落、剥离、起皱现象。</p> <p>The test was according to item 6.11 of the standard JC/T 2170-2013. Relative humidity $85\%\pm 5\%$, temperature from $85^{\circ}\text{C}\pm 2^{\circ}\text{C}$ to $-40^{\circ}\text{C}\pm 2^{\circ}\text{C}$, 10 cycles.</p> <p>The average of effective solar transmittance difference between coated glasses and glasses after experiment: $W 1\%$, no shedding, stripping or wrinkling on the coating.</p>	<p>22#: 0.45%</p> <p>23#: 0.59%</p> <p>24#: 0.33% 膜层无明显脱落、剥离、起皱现象。</p> <p>No shedding, stripping or wrinkling on the coating.</p>	P

测试结果

A LIST OF TEST RESULT

序号 NO.	测试项目 TESTING ITEMS	UNIT	技术要求 TEOTICAL REQUIREMENTS	测试结果 TEST RESULTS	单项评价 JUDGEMENT
8	耐湿热性能 Damp-heat test	—	<p>按照标准 JC/T 2170-2013/6.12 进行。 相对温度为 $85^{\circ}\text{C}\pm 2^{\circ}\text{C}$,相对湿度为 $85\%\pm 5\%$,测试时间为 1000 小时。</p> <p>试验前后太阳光有效透射比的平均值衰减 W1%,且膜层无明显脱落、剥离、起皱现象。</p> <p>The test was according to item 6.12 of the standard JC/T 2170-2013.Relative temperature $85^{\circ}\text{C}\pm 2^{\circ}\text{C}$, relative humidity $85\%\pm 5\%$, 1000h.</p> <p>The average of effective solar transmittance difference between coated glasses and glasses after experiment: W 1%, no shedding, stripping or wrinkling on the coating.</p>	<p>25#: 0.71%</p> <p>26#: 0.62%</p> <p>27#: 0.69% 膜层无明显脱落、剥离、起皱现象。</p> <p>No shedding, stripping or wrinkling on the coating.</p>	P
9	耐砂尘性能 Sand and dust test	—	<p>按照标准 JC/T 2170-2013/6.14 降尘进行。 温度控制在 $23^{\circ}\text{C}\pm 2^{\circ}\text{C}$,从距箱顶端 1/5 高度处吹砂, 自由降尘, 吹砂量 2kg/d,进行 2 天。</p> <p>试验前后太阳光有效透射比的平均值衰减 W1%,且膜层无明显脱落、剥离、起皱现象。</p> <p>The test was according to item 6.14 of the standard JC/T 2170-2013. The temperature was controled in $23^{\circ}\text{C}\pm 2^{\circ}\text{C}$, Blowing sand 1/5 height from the top of the boxb, blowing sand amount 2kg/d, keep for 2days.</p> <p>The average of effective solar transmittance difference between coated glasses and glasses after experiment: ^1%, no shedding, stripping or wrinkling on the coating.</p>	<p>28#: 0.32%</p> <p>29#: 0.30%</p> <p>30#: 0.27% 膜层无明显脱落、剥离、起皱现象。</p> <p>No shedding, stripping or wrinkling on the coating.</p>	P
10	PCT 加速老化 试验 PCT test	—	<p>2 个大气压下, $121^{\circ}\text{C}\pm 0.5^{\circ}\text{C}$,相对湿度保持在 99%-100%,试验时间 24h。</p> <p>试验前后太阳光有效透射比的平均值衰减 W1%。</p> <p>2 atm, $121^{\circ}\text{C}\pm 0.5^{\circ}\text{C}$, relative humidity 99%T00%, 24h.</p> <p>The average of effective solar transmittance difference between coated glasses and glasses after experiment: W 1%.</p>	<p>31#: 0.59%</p> <p>32#: 0.56%</p> <p>33#: 0.55%</p>	P

测试结果

A LIST OF TEST RESULT

序号 NO.	测试项目 TESTING ITEMS	单位 UNIT	技术要求 TECHNICAL REQUIREMENTS	测试结果 TEST RESULTS	单项评价 JUDGEMENT
11	碎片状态 Fragmentation test	—	<p>按照标准 JC/T 2170-2013/6.16 进行。取 4 片样品，每片均需测试。每个样品在 50mmX50mm 区域内最少碎片数为 40,允许有少量长条形碎片，其长度不超过 100mm。</p> <p>The test was according to item 6.16 of the standard JC/T 2170- 2013.Four specimens shall all be impacted. The particle count of each test specimen shall not be less than 40.A few long particles can exist.The length of the longest particle shall not exceed 100mm.</p>	<p>50mm X 50mm 区域内的最少碎片数: Particle count within 50mmX 50mm region: 34#:138 35#:117 36#:126 37#:109 4 块玻璃盘样均无长度超过 100mm 的长条形碎片 The length of longest particle of each specimen did not exceed 100mm.</p>	P
备注 REMARKS	<p>1、玻璃样品共 63 片，3 片为未镀膜钢化玻璃，尺寸大小为 300mmX300mmX3.2mm,编号为 60 片镀膜 钢化玻璃，编号为 4#-63#,其中 34#-37#尺寸大小为 1643mmX 985mmX 3. 2nun,其余尺寸大小为 300mmX 300mmX 3. 2mm。</p> <p>2、“P”代表试验结果满足技术要求。</p> <p>1. There were 63pcs totally. Three pieces uncoated glasses.size 300mmX 300mmX 3. 2mm, were numbered 1#-3#;sixty pieces were coated glasses, numbered 4#-63#;sample 34#-37# were 1643mmX985mmX3. 2mm. others were 300mmX300mmX3. 2mm.</p> <p>2. "P" means pass.</p>				

测试报告附图或照片

Attached Figures & Pictures of Testing



图 1: 300mmX300mmX3. 2mm 原片玻璃样品图
Fig. 1: Picture of the uncoated sample 300mmX 300mmX 3. 2mm

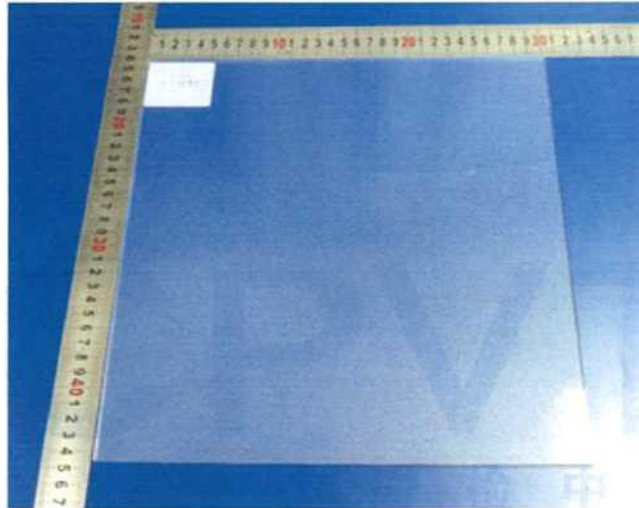


图 2: 300mmX300mmX3. 2mm 镀膜玻璃样品图
Fig. 2: Picture of the coated sample 300mmX300mmX3. 2mm



图 3: 1643mmX985mmX3. 2mm 镀膜玻璃样品图
Fig. 3: Picture of the coated sample 1643mmX985mmX3. 2mm

测试报告附图或照片

Attached Figures & Pictures of Testing

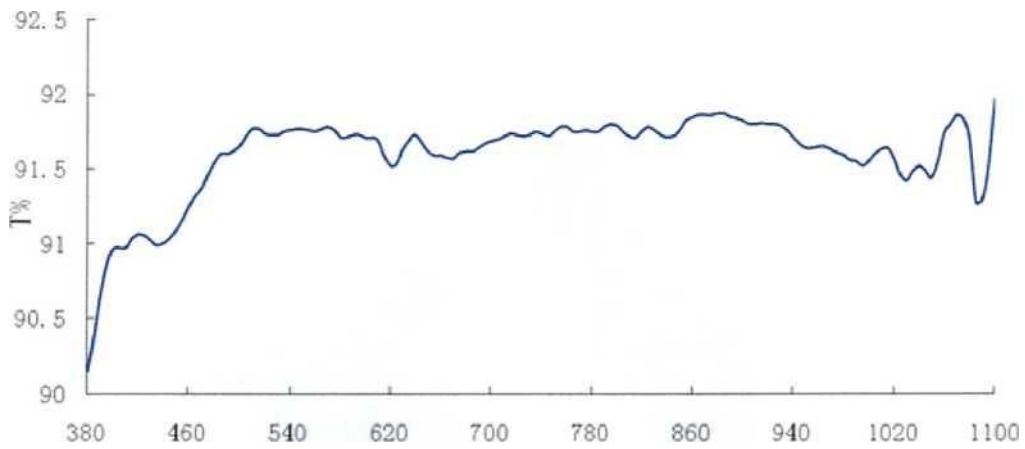


图 4: 1#样品太阳光有效透射比光谱图
Fig. 4:The transmittance spectrum of sample 1#

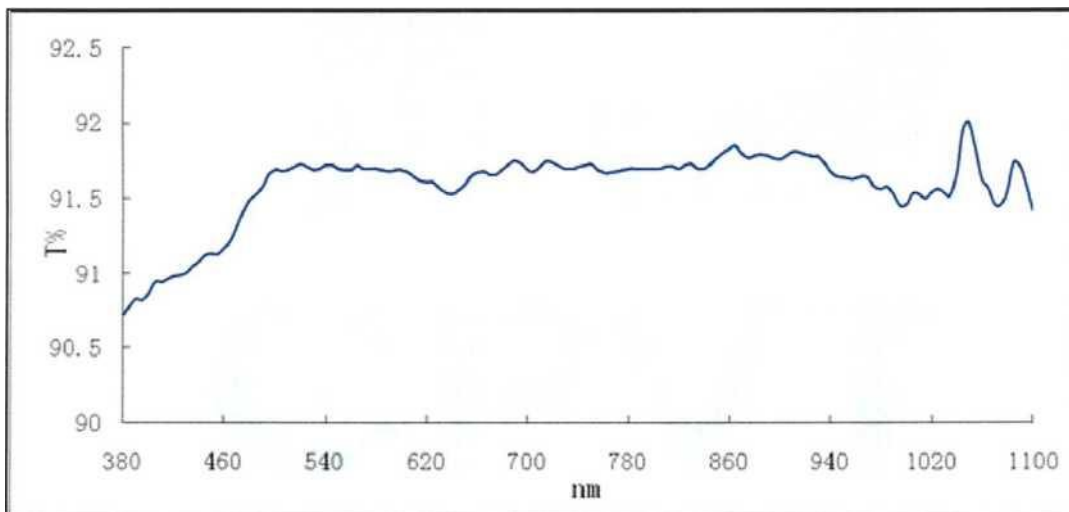


图 5: 2#样品太阳光有效透射比光谱图
Fig. 5:The transmittance spectrum of sample 2#

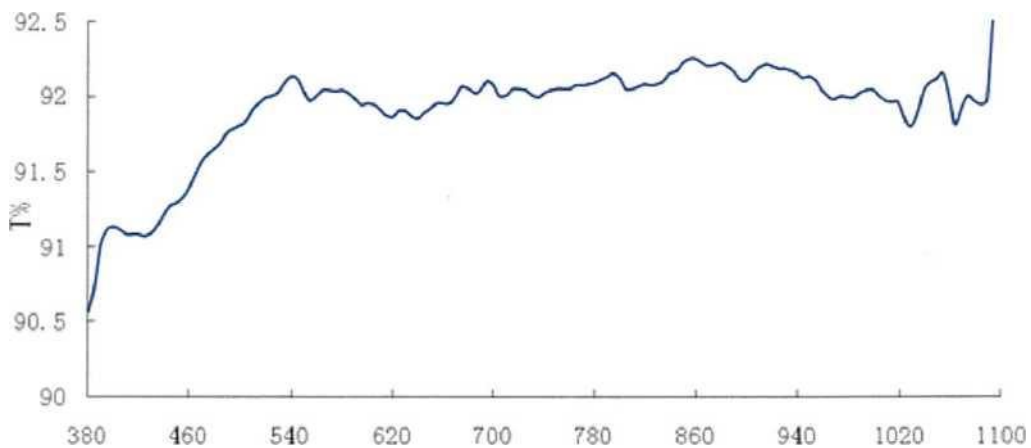


图 6: 3#样品太阳光有效透射比光谱图
Fig. 6:The transmittance spectrum of sample 3#

测试报告附图或照片

Attached Figures & Pictures of Testing

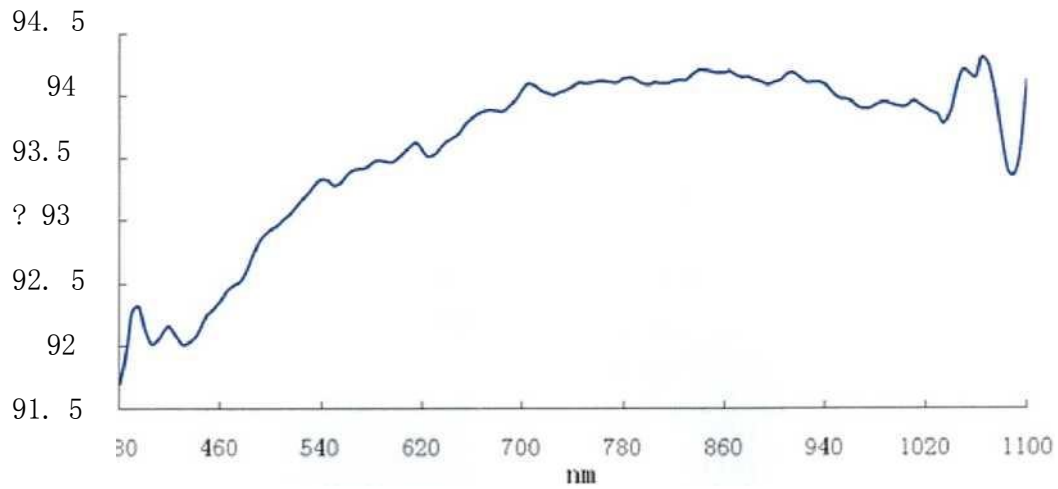


图 7: 4#样品太阳光有效透射比光谱图
Fig. 7: The transmittance spectrum of sample 4#

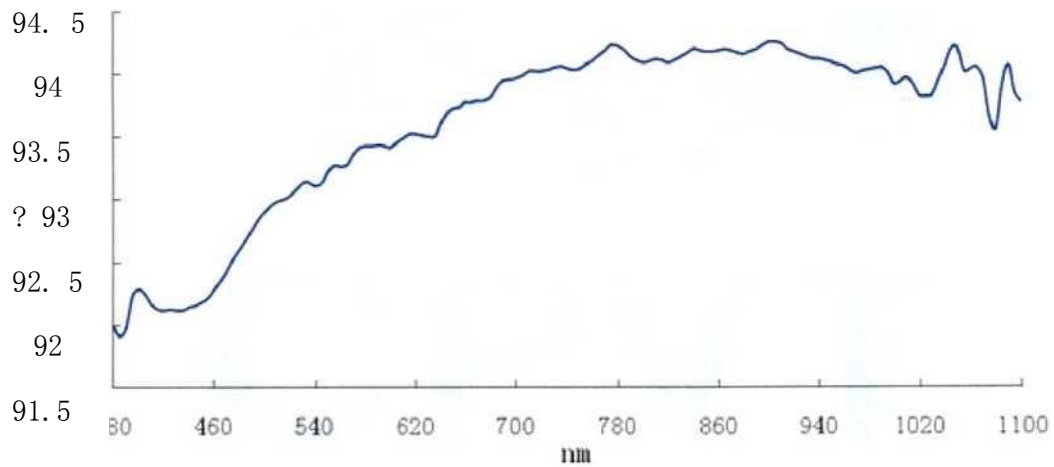


图 8: 5#样品太阳光有效透射比光谱图
Fig. 8: The transmittance spectrum of sample 5#

94.5
94
93.5
93
92.5
92

图 9: 6#样品太阳光有效透射比光谱图
Fig. 9: The transmittance spectrum of sample 6#

测试报告附图或照片

Attached Figures & Pictures of Testing

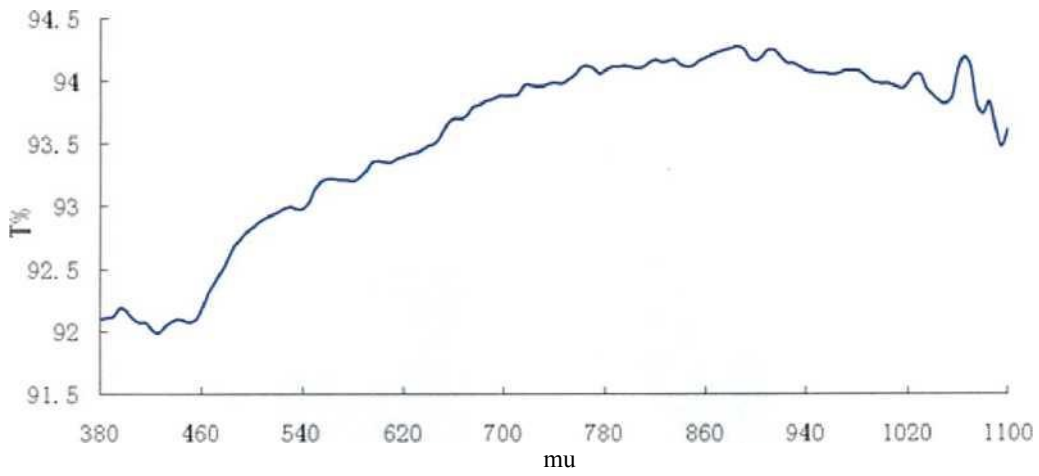


图 10: 7#样品太阳光有效透射比光谱图
Fig. 10: The transmittance spectrum of sample 7#

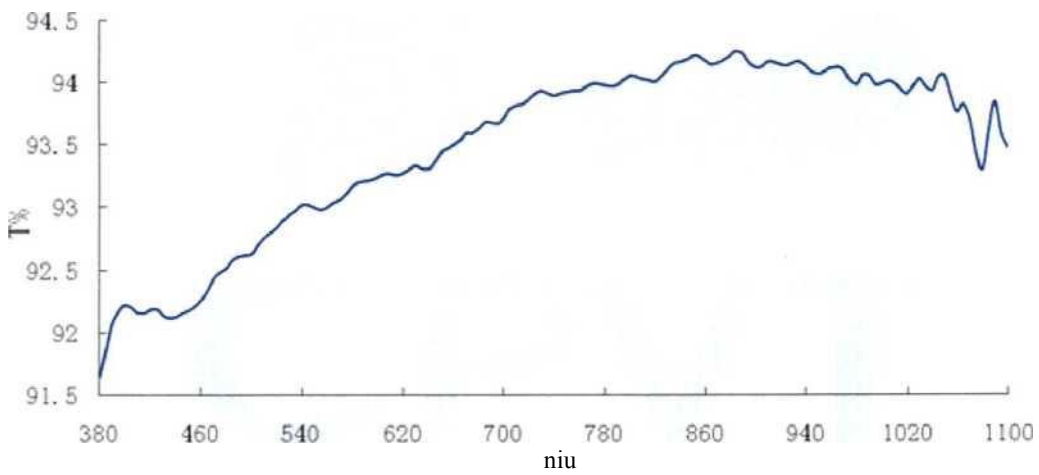


图 11: 舖样品太阳光有效透射比光谱图
Fig. 11: The transmittance spectrum of sample 8#

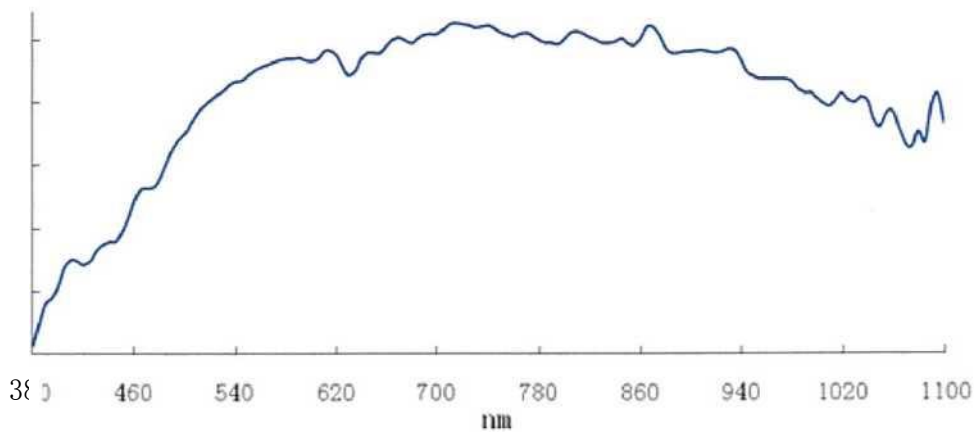
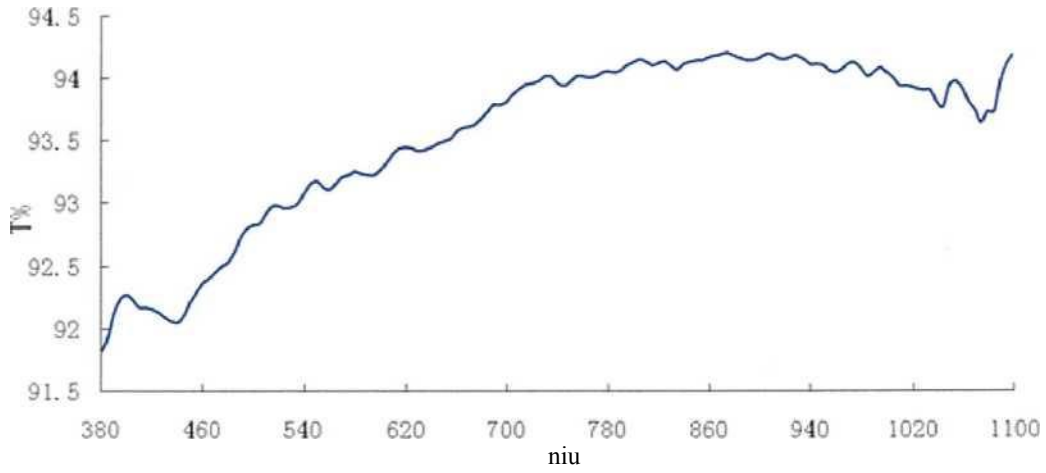


图 9: 6#样品太阳光有效透射比光谱图
Fig. 10: The transmittance spectrum of sample 6#



测试报告附图或照片

Attached Figures & Pictures of Testing

图 13: 10#样品太阳光有效透射比光谱图

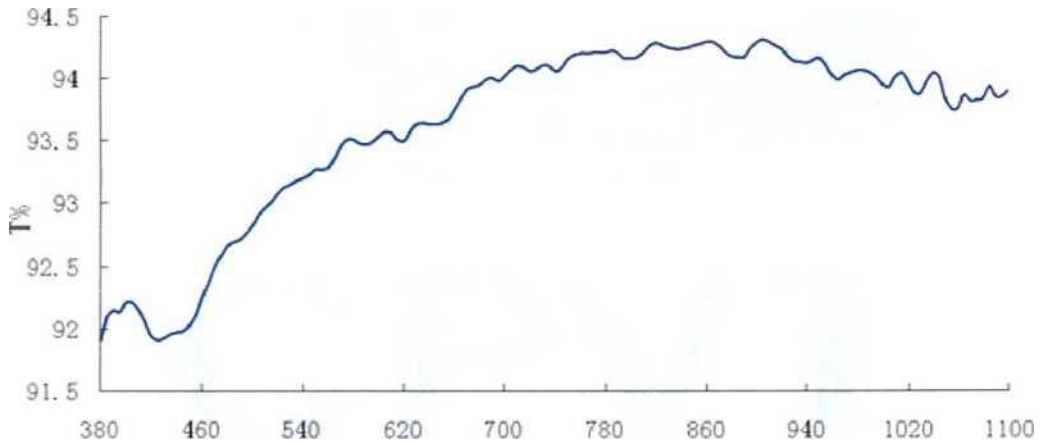


Fig.13:The transmittance spectrum of sample 10#

图 14: 11#样品太阳光有效透射比光谱图

Fig. 14:The transmittance spectrum of sample 11#

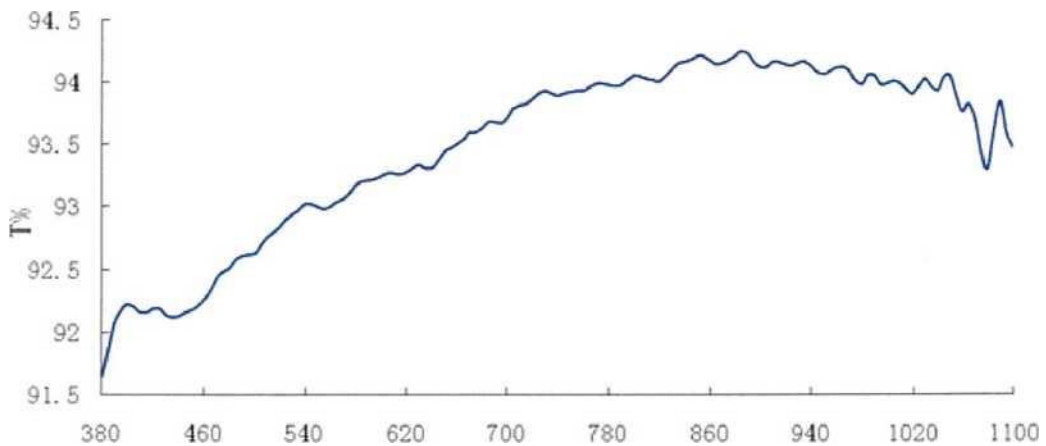


图 12: 9#样品太阳光有效透射比光谱图

Fig.11:The transmittance spectrum of sample 9#

测试报告附图或照片

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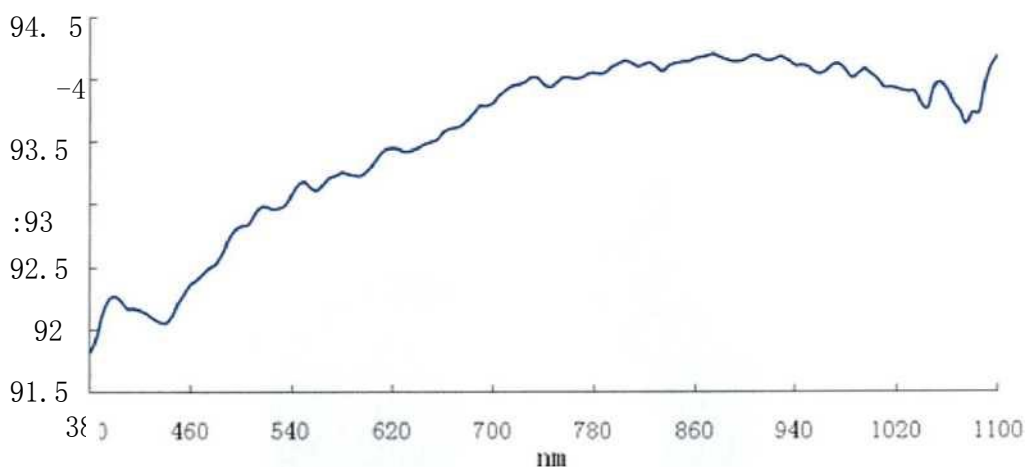


图 16: 13#样品太阳光有效透射比光谱图 Fig.16:The transmittance spectrum of sample 13#

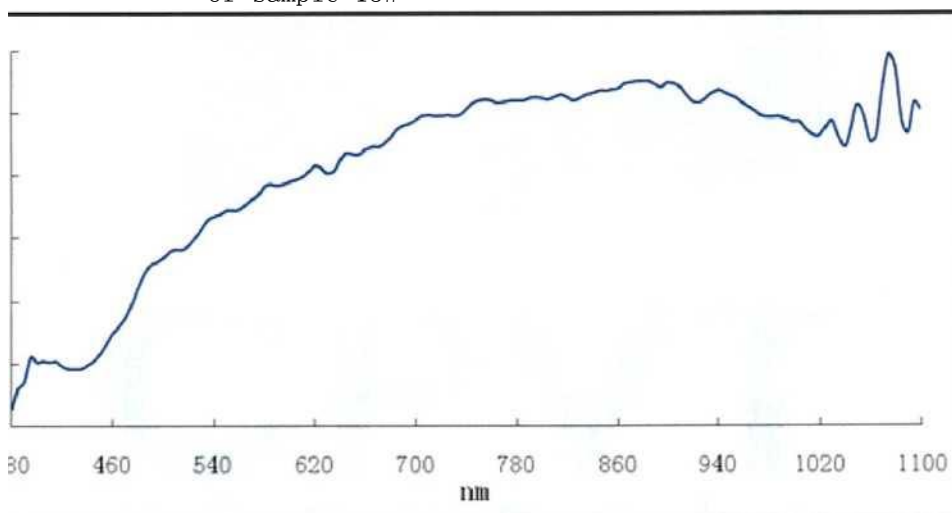


图 17: 14#样品太阳光有效透射比光谱图 Fig.17:The transmittance spectrum of sample 14#

94.5
94
93.5
> 93
92.5
92

图 18: 15#样品太阳光有效透射比光谱图 Fig. 18:The transmittance spectrum of

测试报告附图或照片

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91.5

94.5

94

93.5

? 93

92.5

92

91.5

3

8

0

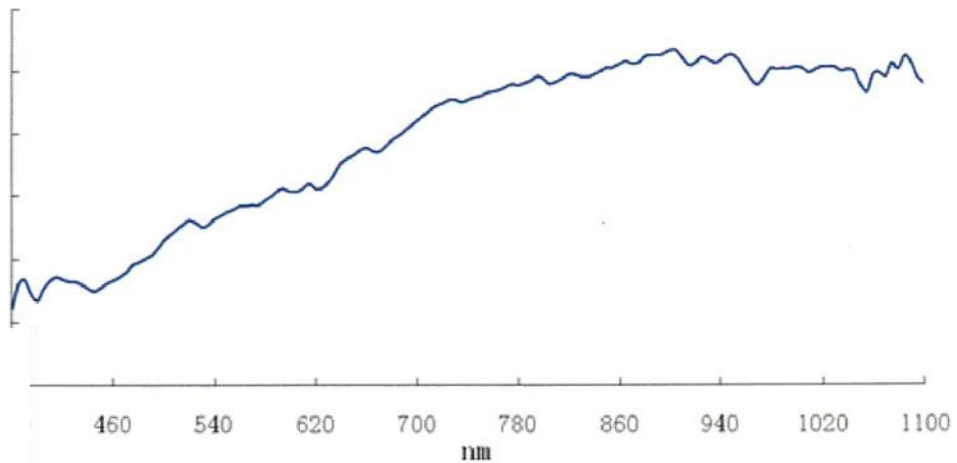


图 18: 15#样品太
阳光有效透射比
光谱图

Fig. 18: The
transmittance
spectrum of

测试报告附图或照片

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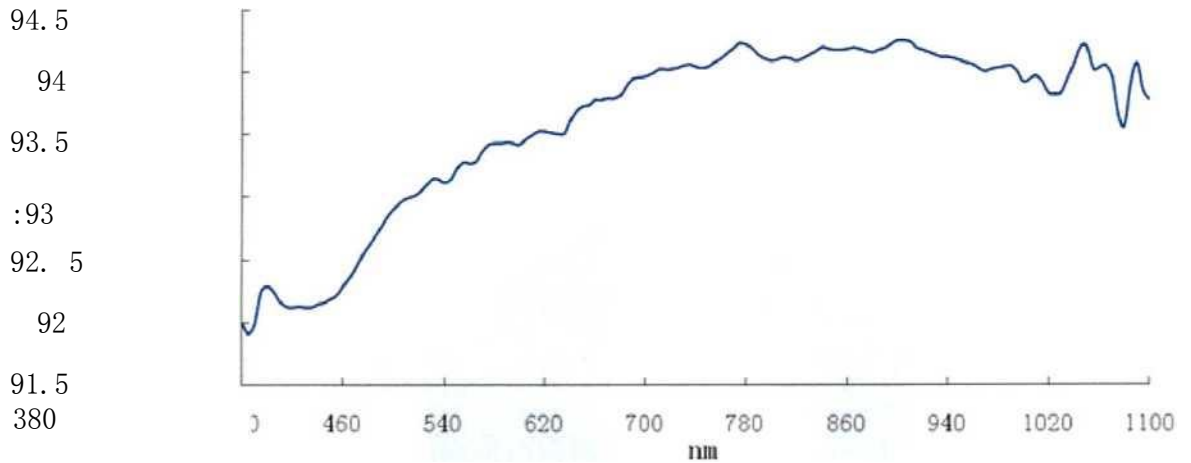


图 19: 16#样品太阳光有效透射比光谱图 Fig. 19:The transmittance spectrum of sample 16#

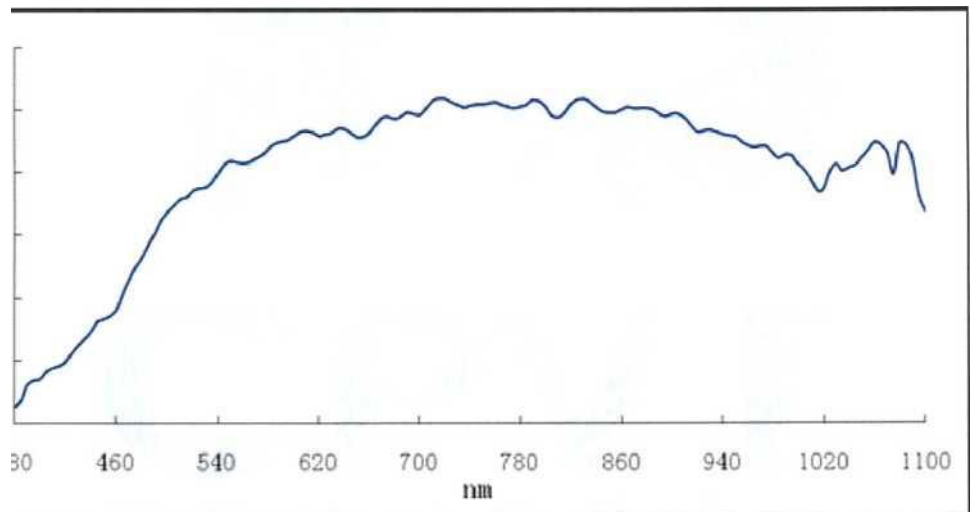


图 20: 17#样品太阳光有效透射比光谱图 Fig. 20:The transmittance spectrum of sample 17#

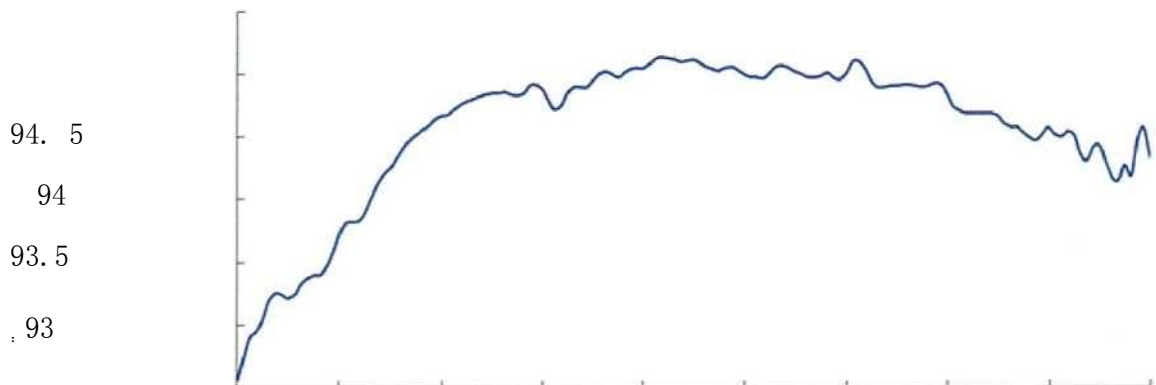


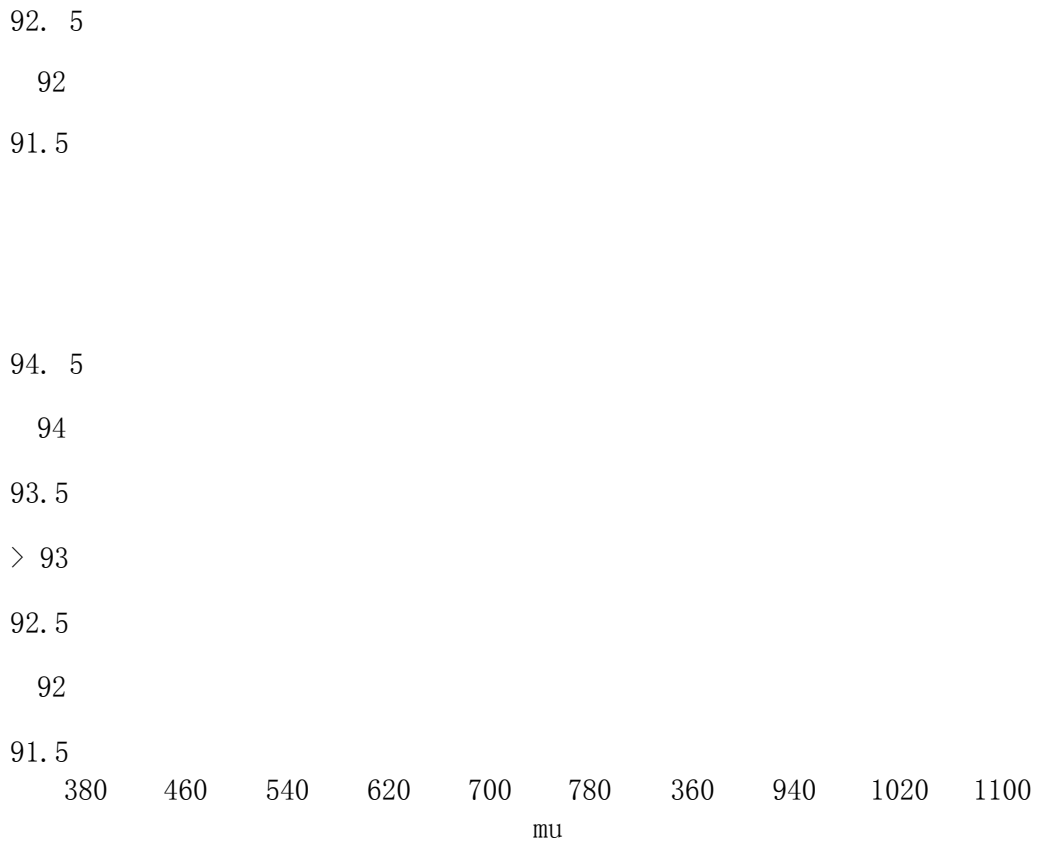
Fig. 21:The transmittance spectrum of sample 18#

测试报告附图或照片

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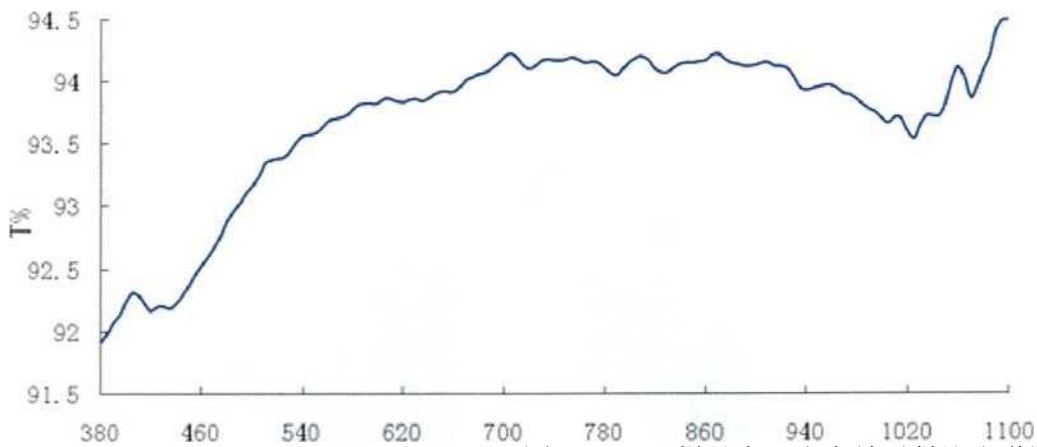


图 22: 19#样品太阳光有效透射比光谱图

Fig. 22: The transmittance spectrum of sample 19#

图 21: 18 首样品太阳光有效透射比光谱图

Fig. 21: The transmittance spectrum of sample 18#

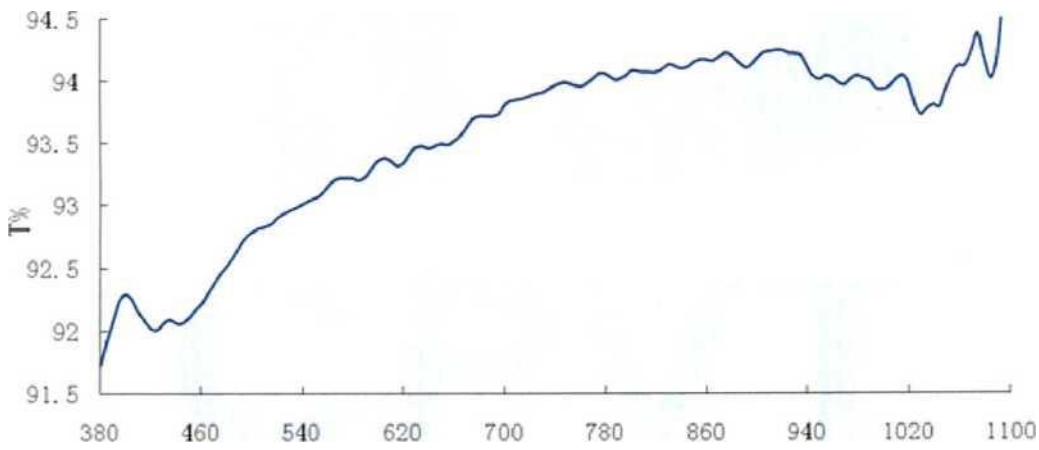


图 23: 20#样品太阳光有效透射比光谱图
Fig. 23:The transmittance spectrum of sample 20#

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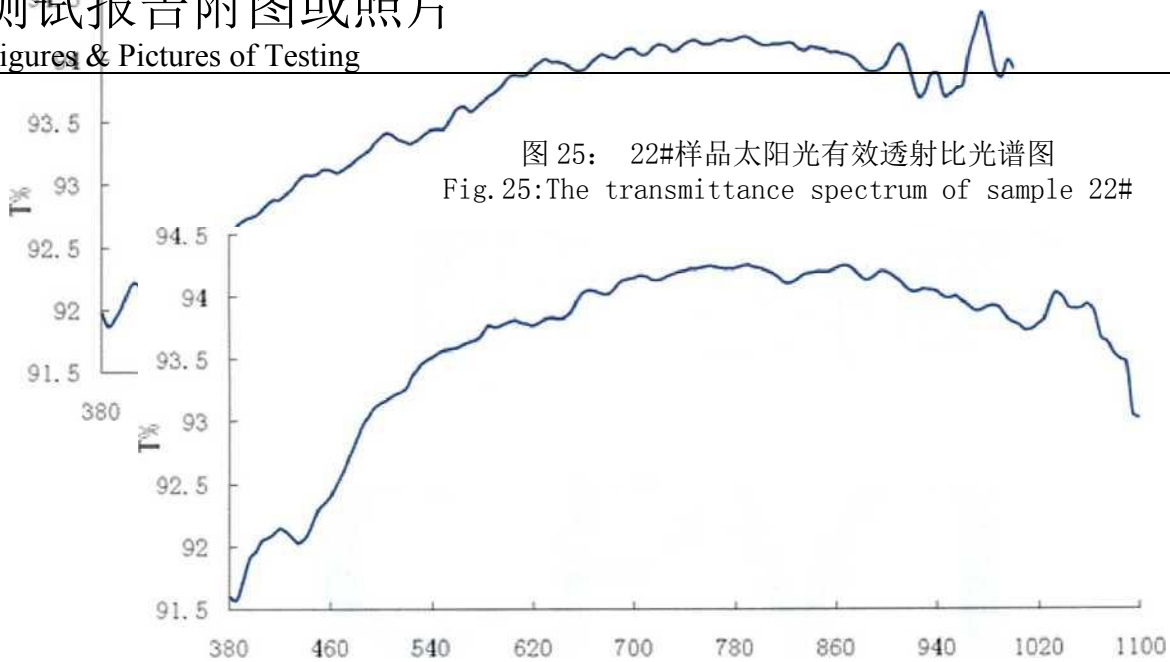


图 25: 22#样品太阳光有效透射比光谱图
Fig. 25:The transmittance spectrum of sample 22#

图 26: 23#样品太阳光有效透射比光谱图
Fig. 26:The transmittance spectrum of sample 23#

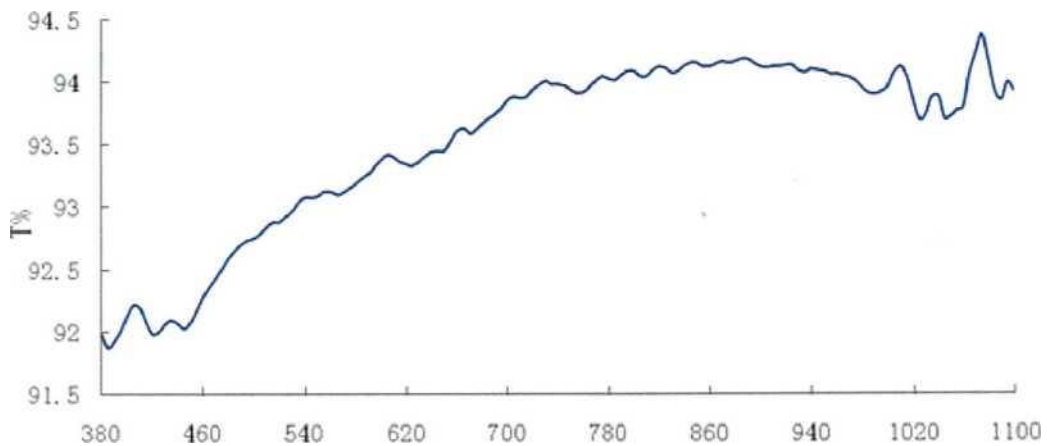


图 6: 3#样品太阳光有效透射比光谱图
Fig. 16:The transmittance spectrum of sample 3#

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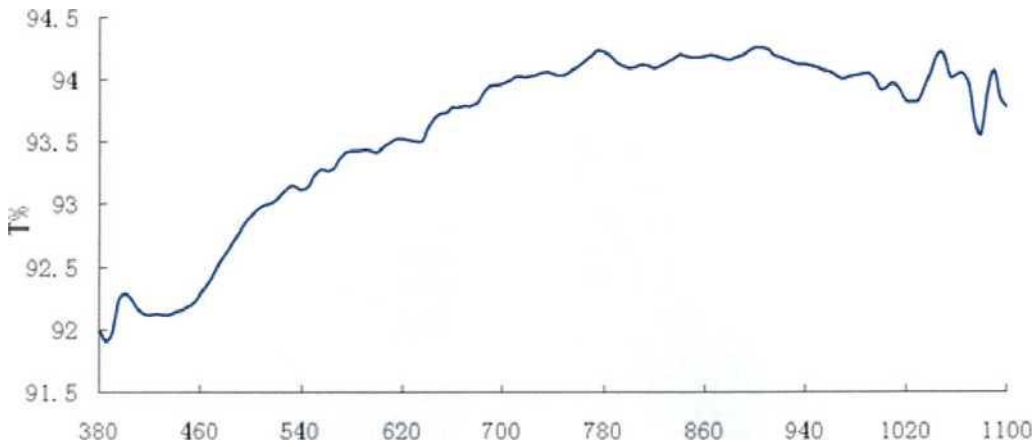


图 28: 25#样品太阳光有效透射比光谱图
Fig.28:The transmittance spectrum of sample 25#

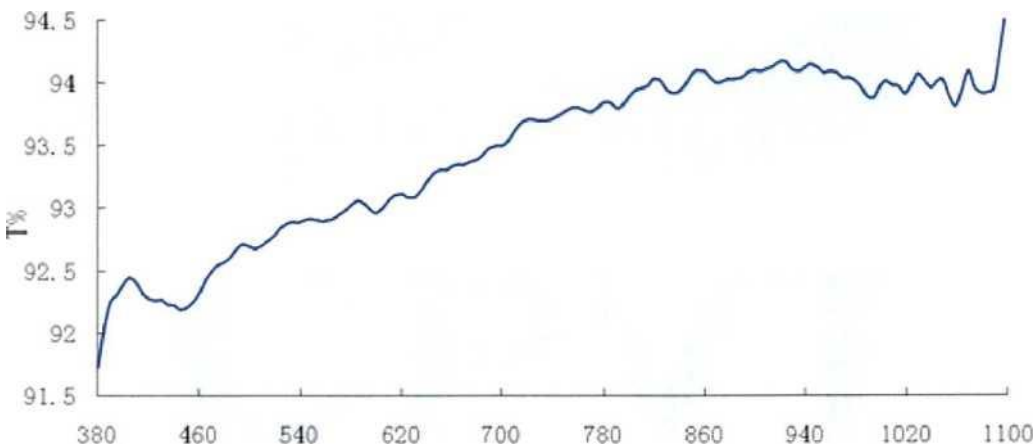


图 29: 26#样品太阳光有效透射比光谱图
Fig.29:The transmittance spectrum of sample 26#

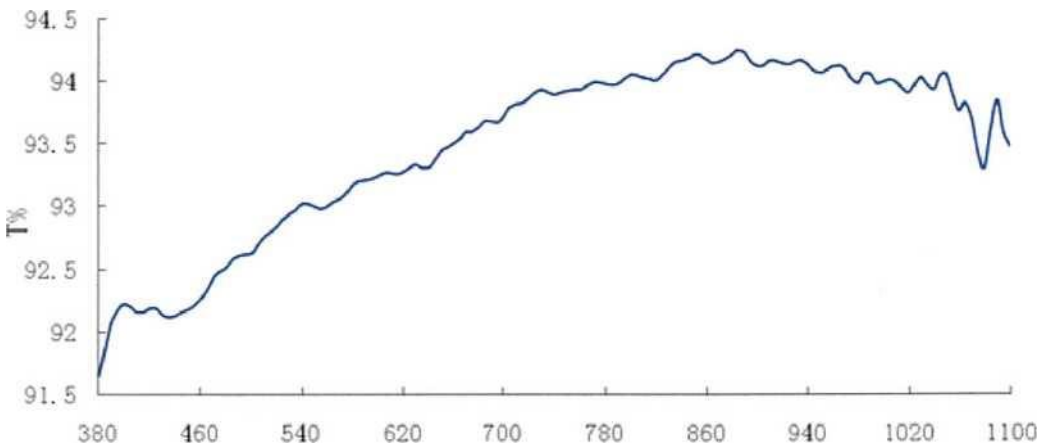


图 30: 27#样品太阳光有效透射比光谱图
Fig. 30:The transmittance spectrum of sample 27#

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94. 5

94

93. 5

:93

92. 5

92

91. 5

94. 5

94

93. 5

? 93

92. 5

92

91. 5

图 33: 30#样品太阳光有效透射比光谱图

Fig. 33: The transmittance spectrum of sample 30#

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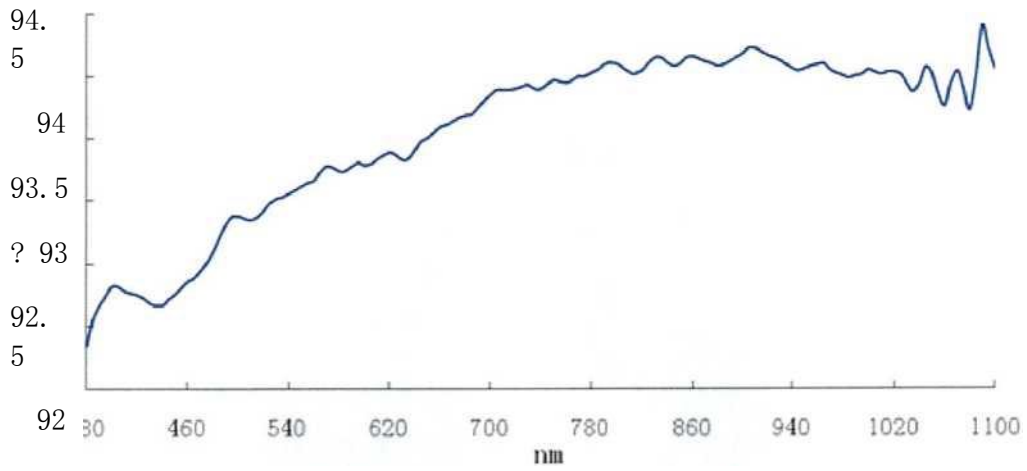


图 31: 28#样品太阳光有效透射比光谱图
Fig.31:The transmittance spectrum of sample 28#

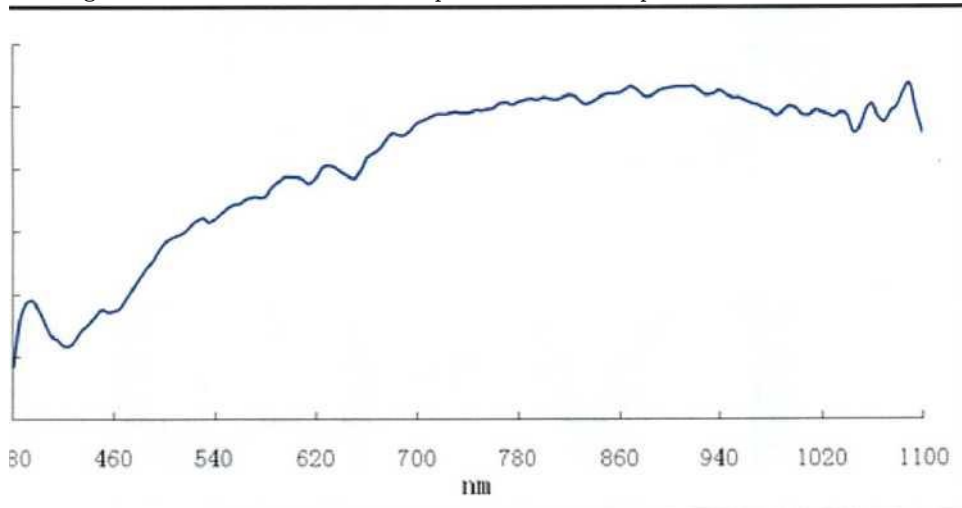


图 32: 29 首样品太阳光有效透射比光谱图
Fig. 32:The transmittance spectrum of sample 29#

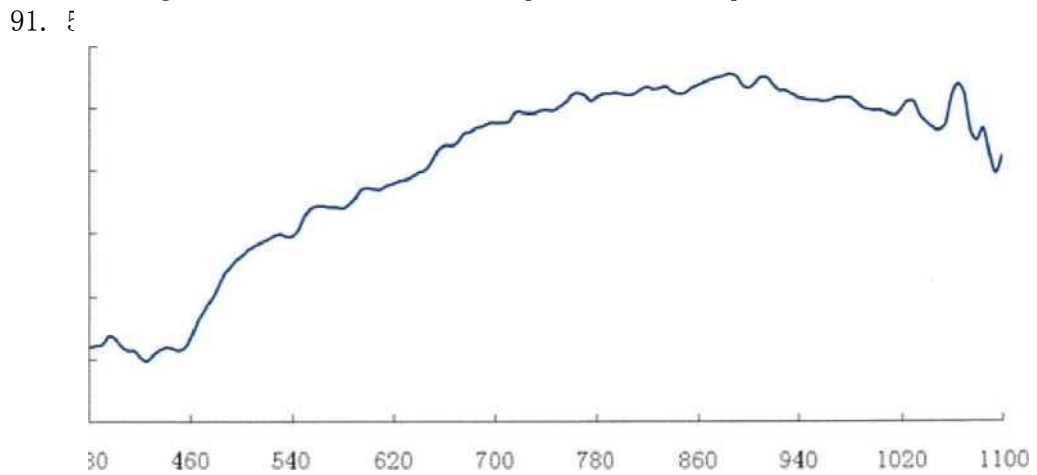


图 33: 30#样品太阳光有效透射比光谱图
Fig. 33:The transmittance spectrum of sample 30#

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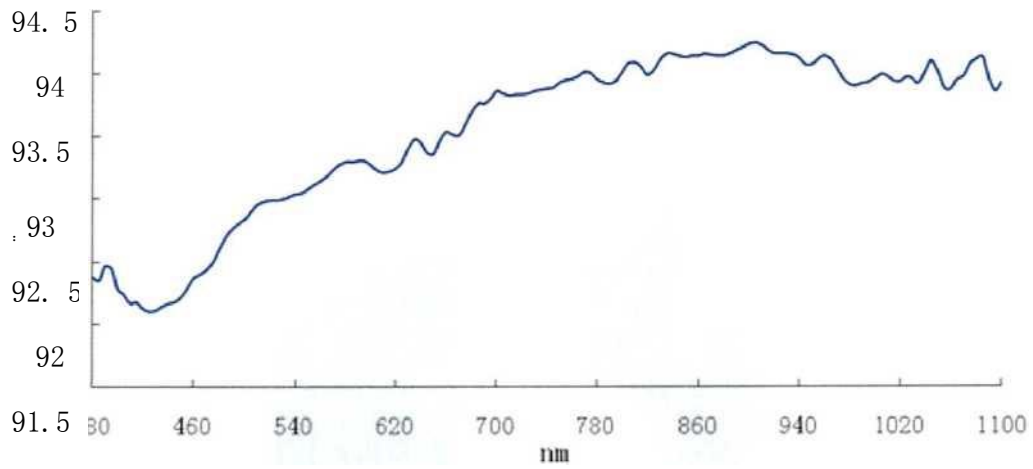


图 34: 31#样品太阳光有效透射比光谱图

Fig. 34:The transmittance spectrum of sample 31#

94.5
94
93.5
93
92.5
92
91.5

图 36: 33#样品太阳光有效透射比光谱图

Fig. 36:The transmittance spectrum of sample 33#

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图 35: 32#样品太阳光有效透射比光谱图

Fig. 35:The transmittance spectrum of sample 32#

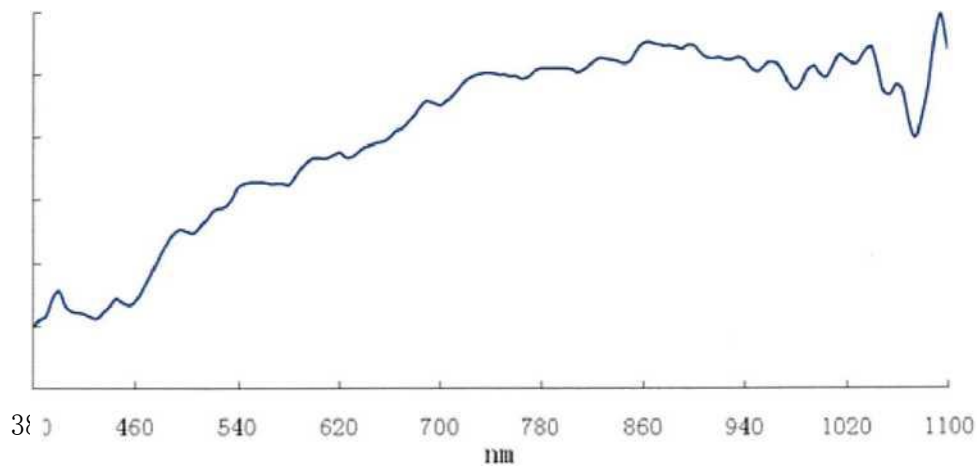
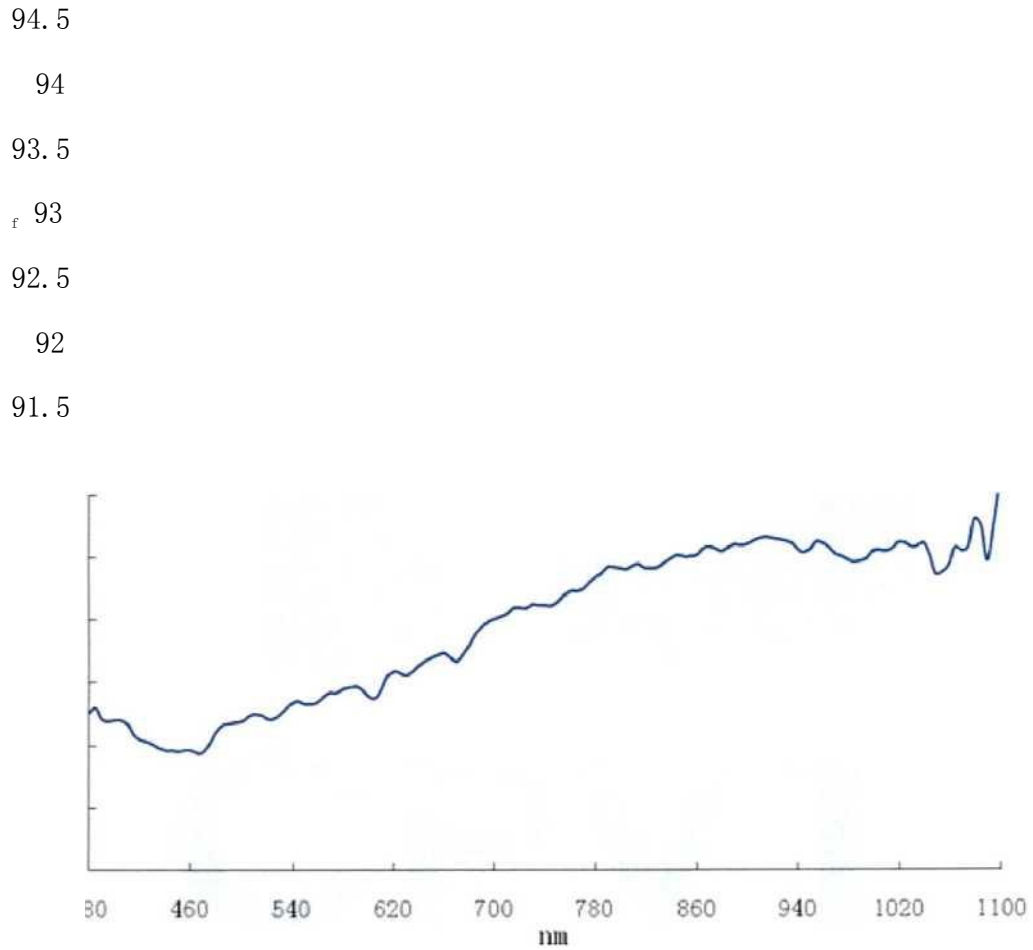


图 36: 33#样品太阳光有效透射比光谱图

Fig. 36:The transmittance spectrum of sample 33#

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图 37: 34#样品碎片状态
Fig. 37: Fragmentation of the
sample 34#



图 38: 35#样品碎片状态
Fig. 38: Fragmentation of the
sample 35#



图 39: 36#样品碎片状态
Fig. 39: Fragmentation of the
sample 36#



图 40: 37#样品碎片状态
Fig. 40: Fragmentation of the
sample 37#

