

PEELING METHODS AND APPARATUS

PRIORITY

[0001] This application claims the benefit of priority under 35 U.S.C. § 119 of U.S. Provisional Application Serial No. 61/906065 filed on November 19, 2013; the content of which is relied upon and incorporated herein by reference in its entirety.

TECHNICAL FIELD

[0002] The present disclosure relates generally to methods and apparatus for peeling substrates and, more particularly, to a methods and apparatus for peeling a first substrate from a second substrate.

BACKGROUND

[0003] There is interest in using thin, flexible glass in the fabrication of flexible electronics or other devices. Flexible glass can have several beneficial properties related to either the fabrication or performance of electronic devices, for example, liquid crystal displays (LCDs), electrophoretic displays (EPD), organic light emitting diode displays (OLEDs), plasma display panels (PDPs), touch sensors, photovoltaics, etc. One component in the use of flexible glass is the ability to handle the glass in a sheet format and not in a roll format.

[0004] To enable the handling of flexible glass during processing of the flexible glass, the flexible glass is typically bonded to a rigid carrier substrate using a polymer binding agent. Once bonded to the carrier substrate, the rigid characteristics and size of the carrier substrate allow the bonded structure to be handled in production without bending or causing damage to the flexible glass. For example, thin-film transistor (TFT) components may be attached to the flexible glass in the production of LCDs.

[0005] After processing, the flexible glass is removed from the carrier substrate. However, given the delicate nature of the flexible glass, the force applied to detach the flexible glass from the carrier substrate can damage the flexible glass. Moreover, the separation process can often damage the carrier substrate as well, rendering the carrier substrate unusable for future use. Accordingly, there is a need for practical solutions for

detaching thin, flexible glass from a carrier substrate, that reduce the potential for damaging the flexible glass or carrier substrate.

SUMMARY

[0006] The following presents a simplified summary of the disclosure in order to provide a basic understanding of some example aspects described in the detailed description.

[0007] In a first aspect of the disclosure, a peeling apparatus for peeling a first substrate from a second substrate comprises a peeling member configured to rotate about a support axis. The peeling member comprises an attachment member including an arcuate surface and configured to releasably mount the first substrate with respect to the arcuate surface. The peeling apparatus further includes a translation mechanism configured to translate the support axis relative to the second substrate to move the peeling member away from the second substrate while the peeling member rotates about the support axis.

[0008] In one example the first aspect, the translation mechanism is configured to lift a weight of the peeling member to move the peeling member away from the second substrate.

[0009] In another example the first aspect, the peeling member is configured to rotate freely about the support axis while the translation mechanism translates the support axis.

[0010] In still another example the first aspect, the arcuate surface comprises a radius of curvature that varies along an outer radial profile of the arcuate surface.

[0011] In yet another example the first aspect, the attachment member comprises one or more vacuum ports.

[0012] In a further example the first aspect, the attachment member comprises a raised surface portion that extends from the arcuate surface, and the raised surface portion comprises a raised surface including a curvature that substantially matches a curvature of the arcuate surface.

[0013] In still a further example the first aspect, the attachment member further includes a sealing member that circumscribes a surface portion of the attachment member.

[0014] In yet a further example the first aspect, the peeling apparatus further comprises a support platform configured to support the second substrate. In one example, the support platform may comprise an attachment portion configured to releasably mount the second substrate to the support platform. In another example, the peeling apparatus may

comprise a locking device configured to releasably lock a movement of the support platform. In still another example, the support platform may be configured to translate while the peeling member rotates about the support axis.

[0015] The first aspect may be carried out alone or with one or any combination of the examples of the first aspect discussed above.

[0016] In a second aspect of the disclosure, a method for peeling a first substrate from a second substrate comprises the step (I) of releasably mounting the first substrate with respect to an arcuate surface of a peeling member. The method further includes the step (II) of releasably mounting the second substrate relative to a support location. The method further includes the step (III) of translating a support axis of the peeling member relative to the second substrate to move the peeling member away from the second substrate, wherein the first substrate peels from the second substrate as the peeling member rotates about the support axis.

[0017] In one example the second aspect, step (III) comprises lifting a weight of the peeling member to move the peeling member away from the second substrate.

[0018] In another example the second aspect, step (I) further comprises the step of positioning the peeling member to produce a moment about the axis during step (III). In one example, the moment of step (III) drives the rotation of the peeling member about the support axis during step (III). In another example, the moment is produced by a weight of the peeling member.

[0019] In still another example the second aspect, step (II) includes releasably mounting the second substrate relative to a support platform comprising the support location, and step (III) further includes translating the support platform as the peeling member rotates about the support axis.

[0020] In yet another example the second aspect, step (II) includes releasably mounting the second substrate relative to a support platform comprising the support location, and step (III) further includes unlocking the support platform to move while the peeling member rotates about the support axis.

[0021] In a further example the second aspect, step (I) includes applying a vacuum.

[0022] In still a further example the second aspect, step (I) includes aligning an edge of a vacuum sealing member with an edge of the first substrate such that an edge portion of the first substrate is releasably vacuum mounted with respect to the arcuate surface of the peeling member.

[0023] The second aspect may be carried out alone or with one or any combination of the examples of the second aspect discussed above.

BRIEF DESCRIPTION OF THE DRAWINGS

[0024] These and other aspects are better understood when the following detailed description is read with reference to the accompanying drawings, in which:

[0025] **FIG. 1** is a side view of an example peeling apparatus;

[0026] **FIG. 2** is an end view of the example peeling apparatus of **FIG. 1**;

[0027] **FIG. 3** is a side view of a peeling member of the example peeling apparatus;

[0028] **FIG. 4** is a bottom view of the peeling member of **FIG. 3**;

[0029] **FIG. 5** is a side view of the example peeling apparatus, wherein a substrate is releasably mounted to the peeling member; and

[0030] **FIG. 6** is a side view of the example peeling apparatus of **FIG. 5** after a support axis has been translated in a direction **D1**.

DETAILED DESCRIPTION

[0031] Examples will now be described more fully hereinafter with reference to the accompanying drawings in which example embodiments are shown. Whenever possible, the same reference numerals are used throughout the drawings to refer to the same or like parts. However, aspects may be embodied in many different forms and should not be construed as limited to the embodiments set forth herein.

[0032] Peeling apparatus of the disclosure can be useful in peeling apart two substrates bonded to each other. In particular, peeling apparatus of the disclosure can be useful in peeling apart a thin, flexible glass sheet from a carrier substrate during the production of various electronic devices. Flexible glass sheets are often used to manufacture liquid crystal displays (LCDs), electrophoretic displays (EPD), organic light emitting diode displays (OLEDs), plasma display panels (PDPs), touch sensors, photovoltaics, etc. To enable the handling of flexible glass during processing of the flexible glass, the flexible glass

is typically bonded to a rigid carrier substrate using a polymer binding agent. The rigid characteristics and size of the carrier substrate allow the bonded structure to be handled in production without bending or causing damage to the flexible glass. Once it is desired to remove the flexible glass sheet from the carrier substrate, peeling apparatus of the disclosure can be useful in peeling the flexible glass sheet from the carrier substrate without damaging the glass sheet or the carrier substrate.

[0033] Turning to FIGS. 1 & 2, an example peeling apparatus 100 is shown that comprises a peeling member 103, an optional support platform 105, and a translation mechanism 107. A bonded structure 109 is further shown that comprises a first substrate 111 bonded to a second substrate 113 such that a major surface 112 of the first substrate 111 faces a major surface 114 of the second substrate 113. The first substrate 111 may be a thin, flexible glass sheet having a thickness less than about 300 μm . Moreover, the second substrate may be a more rigid glass sheet having a thickness greater than about 400 μm . However, the first and second substrates 111, 113 may comprise other materials or have other thicknesses without departing from the scope of the invention.

[0034] The support platform 105 is configured to support the second substrate 113 during operation of the peeling apparatus 100. Meanwhile, the peeling member 103 is configured to rotate about a support axis X and comprises an attachment member 115. The attachment member 115 has an arcuate surface 117 and is configured to releasably mount the first substrate 111 with respect to the arcuate surface 117. The translation mechanism 107 is configured to translate the support axis X relative to the second substrate 113 to move the peeling member 103 away from the second substrate 113 while the peeling member 103 rotates about the support axis X. In particular, the translation mechanism 107 may comprise support arms 119 that respectively translate along guide members 121. The translation mechanism 107 further comprises a support member 123 that supports the peeling member 103 and extends along the support axis X. The support member 123 is supported by the support arms 119. As the support arms 119 translate along the guide members 121, the support member 123 and support axis X will also translate. The peeling member 103, support platform, 105, and translation mechanism 107 are configured such that when the first

substrate **111** is mounted with respect to the arcuate surface **117**, lifting and rotation of the peeling member **103** will peel the first substrate **111** from the second substrate **113**.

[0035] The optional support platform **105** provides a support location for mounting the second substrate. The support platform can comprise an attachment portion **127** configured to releasably mount the second substrate **113** to the support platform **105**. The attachment portion **127** in the present embodiment comprises a plurality of vacuum ports **129**, wherein a vacuum may be selectively supplied to the vacuum ports **129** to selectively mount the second substrate **113** to the support platform **105**. However, the attachment portion **127** in other embodiments may only comprise a single vacuum port. Alternatively, the attachment portion **127** may comprise adhesive or other fastening means for releasably mounting the second substrate **113** to the support platform **105**.

[0036] The support platform **105** may be configured to translate horizontally along guide members **131** while the peeling member **103** rotates about the support axis **X** such that the releasably mounted second substrate **113** translates with the support platform **105**. Moreover, the support platform **105** can comprise a locking device **132** configured to releasably lock the movement of the support platform **105** along the guide members **131**. Although not shown, in further examples, the peeling apparatus may not include a movable support platform. Rather, in some examples the second substrate may be mounted to a table or other support surface, such as the support surface underlying the peeling apparatus. For instance, the peeling apparatus may be mounted for movement relative to the support surface underlying the peeling apparatus. As such, the second substrate may be mounted at a stationary location to a support surface while the peeling apparatus moves relative to the support surface when using the peeling apparatus to peel the first substrate from the second substrate.

[0037] Turning to **FIGS. 3 & 4**, the arcuate surface **117** of the peeling member **103** may comprise a radius of curvature that varies along an outer peripheral profile **301** of the arcuate surface **117**. For example, the radius of curvature may be a distance **R1** from the support axis **X** at one location along the outer peripheral profile **301** while being a different distance **R2** from the support axis **X** at another location along the outer peripheral profile **301**. Preferably, the arcuate surface **117** is configured such that the radius of curvature

increases from end **303** of the outer peripheral profile **301** to end **305** of the outer peripheral profile **301** such that **R2** is greater than **R1**. However, there may be other embodiments wherein the radius of curvature remains constant along the outer peripheral profile **301** of the arcuate surface **117**.

[0038] Also shown in **FIGS. 3 & 4**, the attachment member **115** of the peeling member **103** can comprise a plurality of raised surface portions **307, 309, 311**. Each raised surface portion **307, 309, 311** extends from the arcuate surface **117** and comprises a raised surface having a curvature that substantially matches a curvature of the arcuate surface **117**. The attachment member **115** may also comprise a plurality of vacuum ports **313** that extend through the raised surface portions **307, 309**. A vacuum may be selectively supplied to the vacuum ports **313** to releasably mount portions of the first substrate **111** with respect to the raised surface portions **307, 309**. Additionally, the peeling member **103** can comprise sealing members **315, 317** that are mounted against the arcuate surface **117** and circumscribe the raised surface portions **307, 309**. The sealing members **315, 317** are configured to engage a major surface **133** (shown in **FIGS. 1 & 2**) of the first substrate **111** to provide a vacuum seal between the arcuate surface **117** and the first substrate **111**. Preferably, each sealing member **315, 317** is a flexible and elastic member, such as a gasket or an O-ring. Thus, when mounted against the arcuate surface **117**, surfaces **319, 321** of the flexible sealing members **315, 317** will have a curvature that substantially matches a curvature of the arcuate surface **117**.

[0039] **FIGS. 5 & 6** illustrate one method of peeling the first substrate **111** from the second substrate **113** using the peeling apparatus **100** described above. The method includes the step of releasably mounting the second substrate **113** to a support location. For example, as shown, the method can include the step of releasably mounting the second substrate to the support platform **105** at the support location. The second substrate **113** may be releasably mounted to the support platform **105** using the vacuum ports **129** as described above or the second substrate **113** may be releasably mounted using adhesive or other fastening means. Alternatively, as discussed previously, the apparatus may be provided without a support platform. For example, the method can include the step of releasably mounting the second substrate to at a support location of a support surface underlying the peeling apparatus **100**.

[0040] The method further includes the step of releasably mounting the first substrate **111** with respect to the arcuate surface **117** of the peeling member **103**. Referring to **FIG. 5**, the peeling member **103** may be positioned such that an edge **501** of the sealing member **315** is aligned with an edge **503** of the first substrate **111** and the surface **319** of the sealing member **315** engages an edge portion **505** of the first substrate **111**. A vacuum may then be applied to the vacuum ports **313** in the raised surface portion **307** to releasably vacuum mount the edge portion **505** with respect to the arcuate surface **117** of the peeling member **103**. When pressed against the first substrate **111**, the sealing member **315** will provide a flush seal between the arcuate surface **117** and the first substrate **111**.

[0041] Preferably, the peeling member **103** is positioned such that when the edge portion **505** is initially mounted with respect to the arcuate surface **117**, the peeling member's center of gravity **Cg** is offset from a vertical plane **P** in which the support axis **X** lies. Thus, the weight **F** of the peeling member **103** will produce a moment **M** about the support axis **X**. Since the peeling member **103** is configured to rotate freely about the support axis **X**, the moment **M** (absent other forces and moments) would normally cause the peeling member **103** to rotate about the support axis **X** in the direction of the moment **M**. However, the vacuum applied to mount the edge portion **505** of the first substrate **111** with respect to the peeling member **103** will produce a vacuum force that will help hold the peeling member **103** stationary and prevent the peeling member **103** from rotating. As mentioned above, the support platform **105** can comprise a locking device **132** configured to releasably lock the movement of the support platform **105** along the guide members **131**. When locked, the substrate assembly **109**, which is fixed to the support platform **105** via the vacuum applied through the vacuum ports **129**, will thus be prevented from moving. As such, the peeling member **103**, which is attached to the substrate assembly **109** via the vacuum applied through the vacuum ports **313**, will similarly be prevented from moving. Moreover, because the radius of curvature of the arcuate surface **117** increases from end **303** to end **305** of the outer peripheral profile **301**, the peeling member **103** will further be prevented from rotating in the direction of the moment **M** as a greater clearance will be needed between the support axis **X** and the substrate assembly **109** for the larger radius portions of the peeling member **103** to pass through. Thus, unless the support axis **X** is translated relative to the second substrate

113 to move the peeling member **103** away from the second substrate **113** and increase the clearance between the support axis **X** and the substrate assembly **109**, the peeling member **103** will remain stationary.

[0042] The method further includes the step of translating the support axis **X** of the peeling member **103** relative to the second substrate **113** to move the peeling member **103** away from the second substrate **113**. As shown in **FIG. 5**, the translation mechanism **107** may be operated to translate the support axis **X** away from the second substrate **113** in a direction **D1**, thus lifting the peeling member **103** away from the second substrate **113**. The direction **D1** is preferably vertical. However, the direction **D1** may be any direction that is transverse to the surface **114** of the second substrate **113**. In further examples, although not shown, the support axis **X** of the peeling member **103** may be translated relative to the second substrate by moving the second substrate **113** away from the peeling member, for example, while the peeling member does not translate. For instance, the illustrated second substrate **113** may move downward in a direction opposite direction **D1** to provide relative translation of the support axis **X**.

[0043] The support arms **119** of the translation mechanism **107** may either be raised manually along the guide members **121** or the translation mechanism **107** may comprise a motor that can automatically be operated to adjust the position of the support arms **119**. Since the edge portion **505** of the first substrate **111** is releasably vacuum mounted with respect to the arcuate surface **117** of the peeling member **103**, the peeling member **103** will impart a lifting force at the edge portion **505** as the peeling member **103** is lifted relative to the second substrate, thus causing the edge portion **505** to peel away from the second substrate **113**.

[0044] The method can further comprise the step of unlocking the locking device **132**, which will allow the peeling member **103** to rotate about the support axis **X** as the support axis **X** is translated relative to the second substrate **103**. When the locking device **132** is unlocked, the support platform **132** (and the substrate assembly **109** mounted thereto) can freely translate along the guide members **131**. Thus, the peeling member **103** will no longer be prevented from rotating due to its attachment to the previously rigid substrate assembly **109**. Rather, as the support axis **X** is translated relative to and away from the second substrate **103**, the clearance between the support axis **X** and the substrate assembly **109** will increase,

allowing the peeling member **103** to rotate in the direction of the moment **M**. As the peeling member **103** rotates, the peeling member **103** will pull the first substrate **111** to the right, which in turn will cause the second substrate **113** and the support platform **105** to translate along the guide members **131** in the direction **D2**.

[0045] Although the support platform **105** in the present embodiment is configured to freely translate along the guide members **131**, it should be understood that the support platform **105** in other embodiments may be translated by a motor that can automatically be operated to translate the support platform **105** along the guide members **131** in response to rotation of the peeling member **103**. Furthermore, there may be embodiments wherein the support platform **105** remains stationary but the second substrate **113** is not fixed relative to the support platform **105**. In such embodiments, the second substrate **113** can freely slide across the support platform **105**, if provided, with the first substrate **113** as the first substrate **113** is pulled to the right by the peeling member **103**, thus allowing the peeling member **103** to rotate while the support platform **105** remains stationary.

[0046] As the support axis **X** is translated in direction **D1**, the peeling member **103** will continue to naturally rotate in response to the moment **M**. As the peeling member **103** rotates and is lifted relative to the second substrate **113**, the edge portion **505** will continue to lift with the peeling member **103** and away from the second substrate **103**, causing the first substrate **111** to further peel away from the second substrate **113**. Additionally, the curvature of the arcuate surface **117** is configured such that as the peeling member **103** is lifted and rotates, the sealing member **317** of the peeling member **103** will eventually engage with the first substrate **111**. A vacuum may then be applied to the vacuum ports **313** in the raised surface portion **309** to provide additional lifting force to the first substrate **111** at the portion of the first substrate **111** which engages the sealing member **317**. Thus, the overall lifting force required to peel the first substrate **111** from the second substrate **113** can be spread out over portions of the first substrate **111** such that the necessary lifting force is not completely provided at the edge portion **505**. Such spreading of the lifting force over portions of the first substrate **111** can prevent any one portion of the first substrate from experiencing undesired compressive stresses from high vacuum forces.

[0047] Eventually, continued translation of the support axis **X** in the direction **D1** will allow the peeling member **103** to naturally rotate in response to the moment **M** until its center of gravity **Cg** is directly below the support axis **X** on the plane **P**, as shown in **FIG. 6**. At this point, the peeling member **103** will cease rotating absent additional force as the moment **M** produced by the peeling member's weight **F** will be zero. The first substrate **111** may be completely peeled from the second substrate **113** at this time or the first substrate **111** may be partially peeled from the second substrate **113**. If any portions of the first and second substrates **111**, **113** remain attached, further translation of the support axis **X** in the direction **D1** will lift the peeling member **103** and the releasably mounted first substrate **111** relative to the second substrate **113** and cause the first and second substrates **111**, **113** to completely separate.

[0048] As can be seen in **FIG. 6**, peeling the first substrate **111** from the second substrate **113** using the peeling apparatus **100** and method described above produces a curvature in the first substrate **111** that substantially matches a curvature of the arcuate surface **117** of the peeling member **103**. As the peeling member **103** rotates about the support axis **X** and is lifted relative to the second substrate **113**, the surface **133** of the first substrate **111** engages with the sealing members **315**, **317** and is releasably vacuum mounted at the portions of the first substrate **111** engaging the sealing members **315**, **317**. Additionally, further rotation and lifting of the peeling member will result in the surface **133** of the first substrate **111** engaging the raised surface portion **311**. Since the surfaces of the sealing members **315**, **317** and the raised surface portion **311** have a curvature that substantially matches a curvature of the arcuate surface **117** of the peeling member **103**, the surface **133** of the first substrate **111** will similarly have a curvature that substantially matches a curvature of the arcuate surface **117**. In order to prevent damage to the first substrate **111**, the curvature produced will preferably result in the first substrate **111** being placed under a bending stress that does not exceed the yield strength of the first substrate **111**.

[0049] The apparatus **100** and method of using the apparatus **100** described above can permit the first substrate **111** to be peeled from the second substrate **113** by applying a single linear force to translate the support axis **X** away from the second substrate **113**. The peeling member **103** will naturally rotate as the support axis **X** is translated away from the second

substrate **113**. Moreover, the optional support platform **105** and the second substrate **113** will translate (e.g., horizontally) in response to the pulling motion that the peeling member **103** exerts on the first substrate **111** as the peeling member **103** naturally rotates. Thus, a smooth peeling motion may be applied to the first substrate **111** with a single linear force.

[0050] It will be apparent to those skilled in the art that various modifications and variations can be made without departing from the spirit and scope of the claimed invention. For example, as discussed previously, although the translation mechanism **107** in the apparatus **100** described above is configured to lift the peeling member **103** away from the second substrate **113**, the translation mechanism **107** in other embodiments may lower the second substrate **113** away from the peeling member **103** to achieve the same peeling motion. Moreover, although the peeling member **103** rotates naturally as the support axis **X** is translated, the rotation of the peeling member **103** in other embodiments may be controlled either manually or automatically. Furthermore, although the attachment member **115** of the peeling member **103** in the apparatus **100** described above comprises a plurality of raised portions **307**, **309**, **311** and sealing members **315**, **317** that are configured to engage the surface **133** of the first substrate **111**, the attachment member **115** may not comprise any raised portions or sealing members in other embodiments. Rather, the surface **133** of the first substrate **111** may engage directly with the arcuate surface **117** of the attachment member **115** during operation of the peeling apparatus **100**. Indeed, the attachment member **115** may comprise any number of raised portions and sealing members, or none at all, without departing from the scope of the invention. These are just a few examples of variations that can be made to the apparatus and method described above. Other various modifications and variations can be made without departing from the spirit and scope of the claimed invention.

CLAIMS

What is claimed is:

1. A peeling apparatus for peeling a first substrate from a second substrate comprising:
 - a peeling member configured to rotate about a support axis, wherein the peeling member comprises an attachment member including an arcuate surface and configured to releasably mount the first substrate with respect to the arcuate surface; and
 - a translation mechanism configured to translate the support axis relative to the second substrate to move the peeling member away from the second substrate while the peeling member rotates about the support axis.
2. The peeling apparatus of claim 1, wherein the translation mechanism is configured to lift a weight of the peeling member to move the peeling member away from the second substrate.
3. The peeling apparatus of claim 1, wherein the peeling member is configured to rotate freely about the support axis while the translation mechanism translates the support axis.
4. The peeling apparatus of claim 1, wherein the arcuate surface comprises a radius of curvature that varies along an outer radial profile of the arcuate surface.
5. The peeling apparatus of claim 1, wherein the attachment member comprises one or more vacuum ports.
6. The peeling apparatus of claim 1, wherein the attachment member comprises a raised surface portion that extends from the arcuate surface, and the raised surface portion comprises a raised surface including a curvature that substantially matches a curvature of the arcuate surface.

7. The peeling apparatus of claim 1, wherein the attachment member further includes a sealing member that circumscribes a surface portion of the attachment member.
8. The peeling apparatus of claim 1, further comprising a support platform configured to support the second substrate.
9. The peeling apparatus of claim 8, wherein the support platform comprises an attachment portion configured to releasably mount the second substrate to the support platform.
10. The peeling apparatus of claim 8, further comprising a locking device configured to releasably lock a movement of the support platform.
11. The peeling apparatus of claim 8, wherein the support platform is configured to translate while the peeling member rotates about the support axis.
12. A method for peeling a first substrate from a second substrate comprising the steps of:
 - (I) releasably mounting the first substrate with respect to an arcuate surface of a peeling member;
 - (II) releasably mounting the second substrate relative to a support location; and
 - (III) translating a support axis of the peeling member relative to the second substrate to move the peeling member away from the second substrate, wherein the first substrate peels from the second substrate as the peeling member rotates about the support axis.
13. The method of claim 12, wherein step (III) comprises lifting a weight of the peeling member to move the peeling member away from the second substrate.

14. The method of claim 12, wherein step (I) further comprises the step of positioning the peeling member to produce a moment about the axis during step (III).
15. The method of claim 14, wherein the moment of step (III) drives the rotation of the peeling member about the support axis during step (III).
16. The method of claim 14, wherein the moment is produced by a weight of the peeling member.
17. The method of claim 12, wherein step (II) includes releasably mounting the second substrate relative to a support platform comprising the support location, and step (III) further includes translating the support platform as the peeling member rotates about the support axis.
18. The method of claim 12, wherein step (II) includes releasably mounting the second substrate relative to a support platform comprising the support location, and step (III) further includes unlocking the support platform to move while the peeling member rotates about the support axis.
19. The method of claim 12, wherein step (I) includes applying a vacuum.
20. The method of claim 12, wherein step (I) includes aligning an edge of a vacuum sealing member with an edge of the first substrate such that an edge portion of the first substrate is releasably vacuum mounted with respect to the arcuate surface of the peeling member.