[0073] In the micro-fluid passage element **20**, a flat quartz glass substrate **2** and a flat quartz glass substrate **3** are joined together while interposing a laminated layer consisting of a polysilicon thin film **4**, an alkali ion-containing glass layer (for example, borosilicate glass thin film) **5**, a silicon oxide film ($SiO_2$) **21**, a polysilicon thin film **6** and a piercing hole **7**.

[0074] The piercing hole **7** functions as a fluid passage, and is a space made by cutting the laminated film (including the polysilicon thin film **4**, the borosilicate glass thin film **5**, the silicon oxide film ($SiO_2$) **21** and the polysilicon thin film **6**), and defined by the surface of the quartz glass substrate **2** and the bottom surface of the groove made in the quartz glass substrate **3**.

[0075] The micro fluid passage element **20** is formed by adding a step of forming a silicon oxide film **21** on the surface of the borosilicate glass thin film **5** by sputtering, between the steps shown in **FIGS. 2B and 2C**. It is preferable that the thickness of the silicon oxide film **21** should be 500 $\mu$m or less.

[0076] In the micro-fluid passage element **20**, a silicon oxide film **21** serving as an insulating member is interposed between the borosilicate glass thin film **5** and the polysilicon thin film **6**. With this structure, a further advantage can be obtained in addition to the effect of the micro-fluid passage element **1** prepared in the first embodiment. That is, current leakage caused by dielectric breakdown during anodic joining can be obtained. Therefore, the joining can be easily carried out. At the same time, it becomes easy to apply a high voltage between the polysilicon thin film **4** and the polysilicon thin film **6**, and therefore the films can be easily joined even if the borosilicate glass thin film **5** is made thin.

[0077] Next, **FIG. 5** shows a schematic view of the structure of a micro-fluid passage element according to the third embodiment.

[0078] A micro-fluid passage element **30** of this embodiment is an alternative version of the second embodiment, and in this embodiment, a polysilicon thin film **31** is formed on one surface of the micro-fluid passage element **20** of the second embodiment. Such a micro micro-fluid passage element **30** can be prepared by removing the polysilicon thin film **4** or polysilicon thin film **6** on one surface of the element **30**, whereas leaving the polysilicon thin film on the other surface thereof, in the above-described **FIG. 3E**. **FIG. 5** illustrates an example in which a film deposited during the formation of the polysilicon thin film **6** is left as a polysilicon thin film **31**.

[0079] The micro-fluid passage element **30** having the above-described structure, in which the polysilicon thin film **31** is formed on one surface thereof, naturally entails the same operation and effect as those of the micro-fluid passage elements **1** and **20**. Besides this, in the element **30**, a light emitting element and a light receiving element are provided on the quartz glass substrate **2** on the upper side of the micro-fluid passage element, such that detection light is made incident from the quartz glass substrate **2**, and the reflection light is detected. With this structure, the reflectance of light is improved during the analysis, thus enhancing the detection sensitivity.

[0080] It should be noted that in this embodiment, for example, the polysilicon thin film **31** which serves as a light reflection film, may be made of some other material than that used in this embodiment, or a metal thin film such as of aluminum may be provided in place of the polysilicon thin film **6**.

[0081] **FIG. 6** shows a schematic view of the structure of a micro-fluid passage element according to the fourth embodiment.

[0082] Further, **FIG. 7A** shows an upper surface of a micro-fluid passage element **40** of this embodiment, and **FIG. 7B** shows a cross section taken along the line A-A in **FIG. 7A**. It should be noted that the lower surface of the micro-fluid passage element **40** has the same shape as that of the upper surface shown in **FIG. 6**. The structural elements of this embodiment, which are similar to those shown in **FIG. 5**, are designated by the same reference numerals.

[0083] A micro-fluid passage element **40** has a structure in which a polysilicon thin film **31** and a polysilicon thin film **41** are formed on the respective surfaces of the before-described micro-fluid passage element **20**, and a plurality of windows **42** are formed in the direction normal to the direction of the fluid passage **7**, in sections of the polysilicon thin films **31** and **41**, which interpose the fluid passage **7** therebetween, such that positions of the windows face to each other.

[0084] For example, windows **42***a* to **42***f* shown in **FIG. 7B** function as observation windows for receiving light from one surface, and detecting transmitted light from the other surface, and therefore it becomes possible to detect a substance which passes through a particular site of the fluid passage without especially collecting the detection light during an optical analysis. In particular, when these windows are reduced to a mico-size, it becomes possible to analyze a micro-area.

[0085] Next, the preparation of the micro-fluid passage element **40** will now be described with reference to the steps illustrated in **FIGS. 8A** to **8**E.

[0086] As can be seen in **FIG. 8**A, the structure of this embodiment is formed by the manufacturing process for the second embodiment shown in **FIG. 4**, and the embodiment is an element substrate obtained by joining the fluid passage structuring substrate **10** and the fluid passage structuring substrate **13** together by the anodic joining method, while interposing the silicon oxide film **21** therebetween.

[0087] Then, as can be seen in **FIG. 8**B, photoresists are formed on the surfaces of the polysilicon thin films **4** and **6** which cover the respective surfaces of the element substrate formed by the joining as shown in **FIG. 8**A, by spin-coating, and thus resist thin films **8** are formed.

[0088] After that, as can be seen in **FIG. 8**C, each resist thin film **8** is patterned to have shapes of windows **42** as shown in **FIG. 6**, using the photolithographic technique, and thus a resist mask **8***a* is formed. Then, as shown in **FIG. 8**D, an RIE is carried out with use of the resist mask **8***a* as a mask, so as to remove the exposed sections of the polysilicon thin films **4** and **6**, thus forming the polysilicon thin films **4** and **6** having the windows **42**.

[0089] Further, as can be seen in **FIG. 8**E, the resist mask **8***a* is removed by the plasma asher, and thus a micro-fluid passage element **40** having three windows **42** on both surfaces thereof is formed. Although the figures show that