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(54) **ADAPTOR FOR MICROSCOPES**

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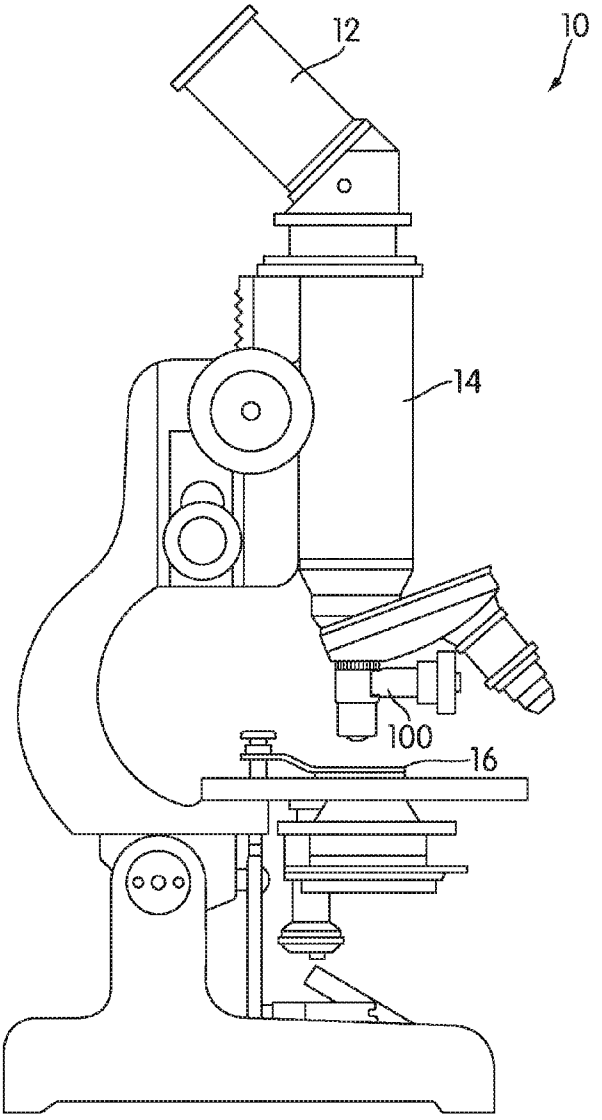
(57) **ABSTRACT**

A fluorescent microscope attachment is disclosed that includes a removable filter arm to provide an adaptor for use in transforming a light microscope into a fluorescent microscope. The adaptor may further include an LED light source and/or a magnetic microscope objective attachment.



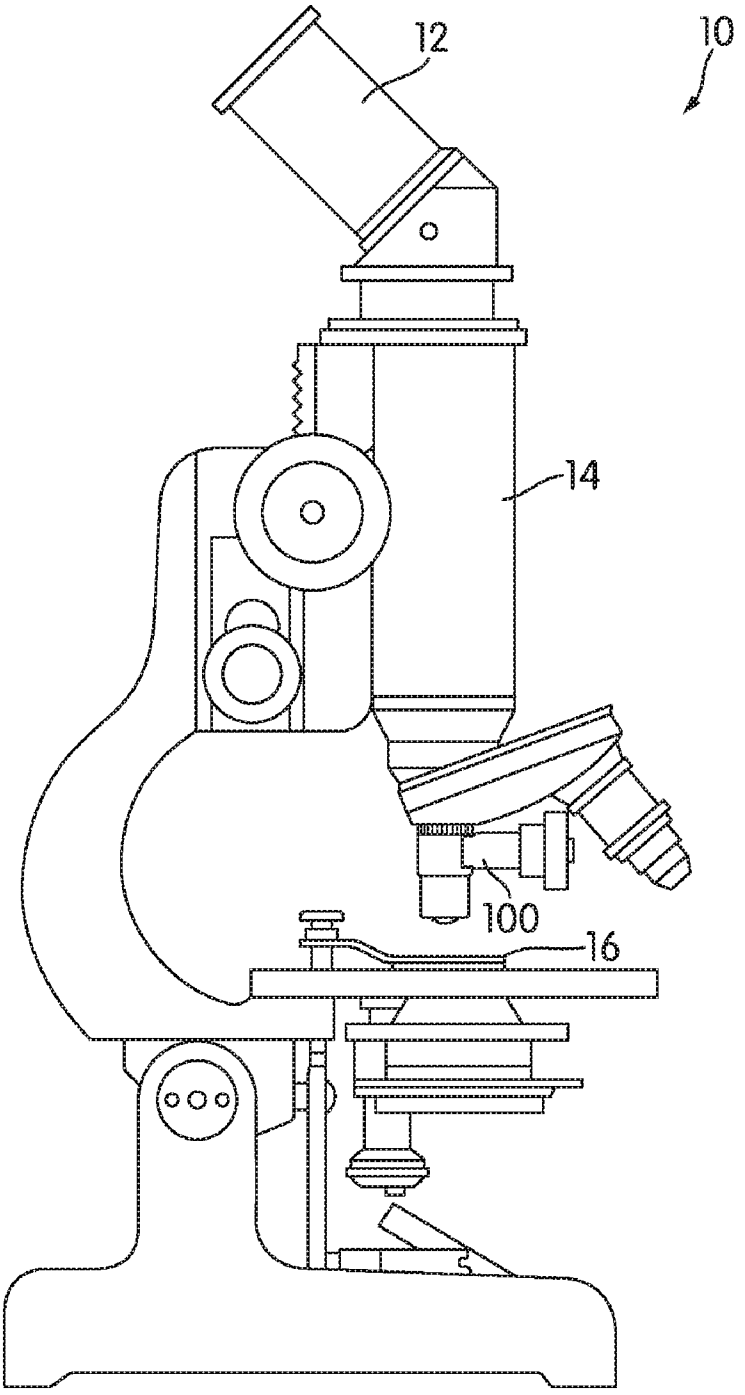


FIG. 1

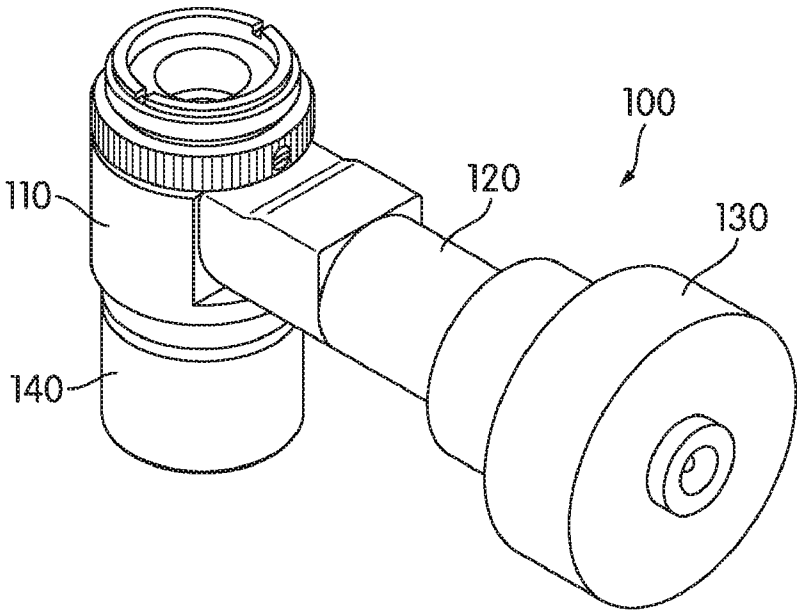


FIG. 2

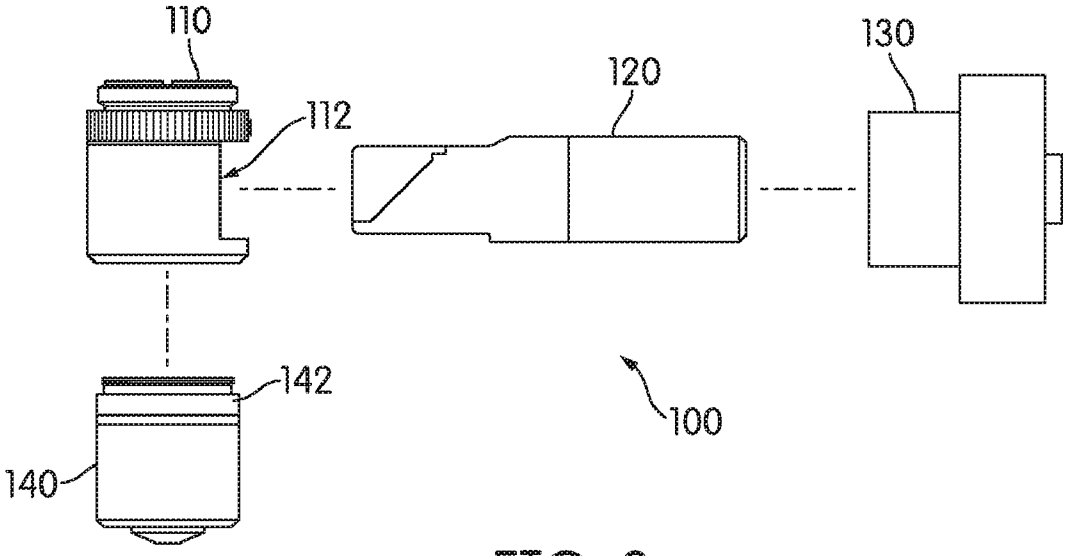


FIG. 3

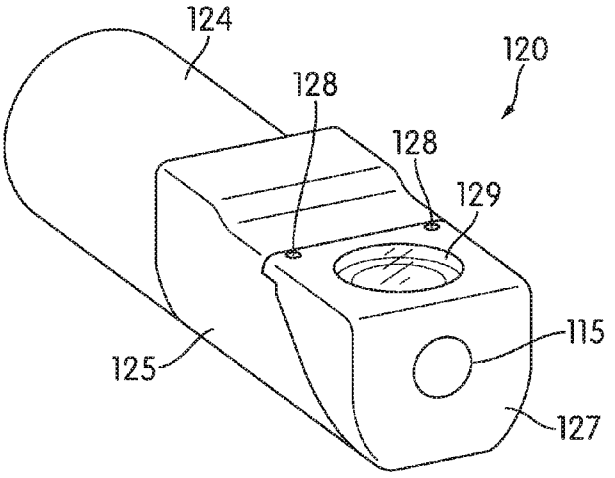

124
120
128
128
129
115
125
127

FIG. 4a

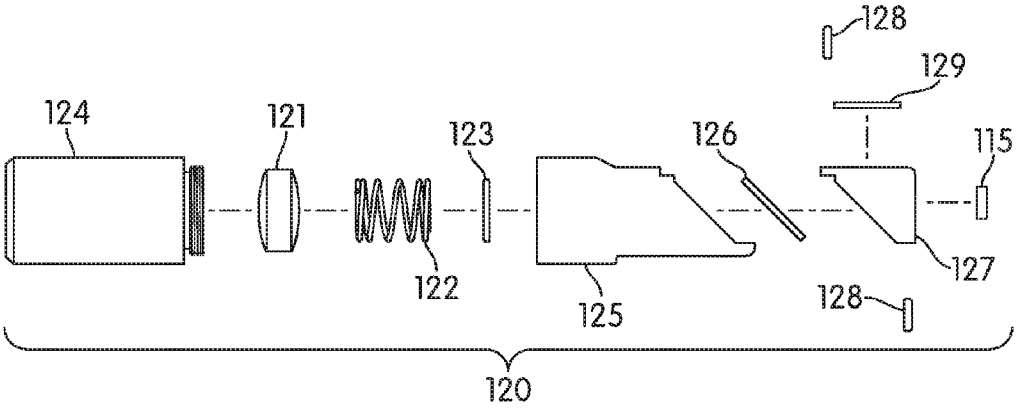

128
129
124
121
123
126
115
127
122
125
128
120

FIG. 4b

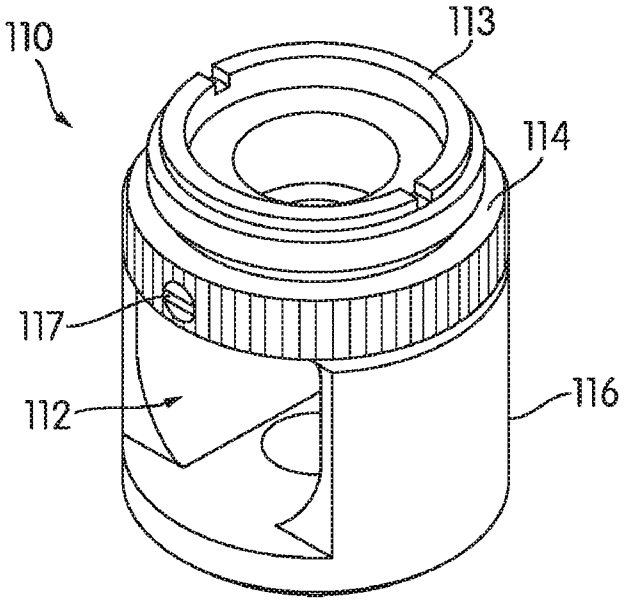


FIG. 5a

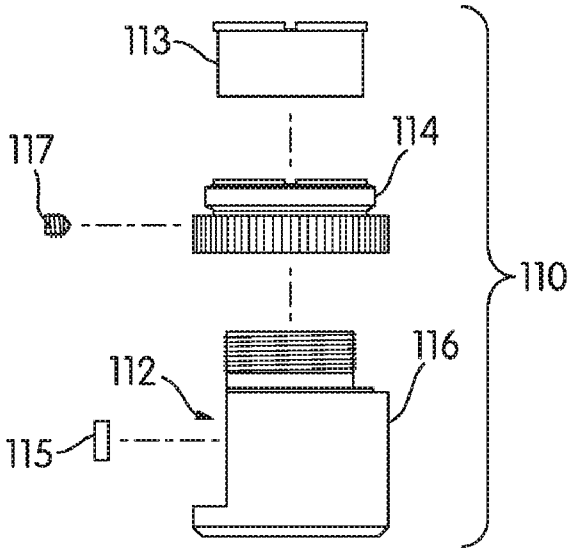


FIG. 5b

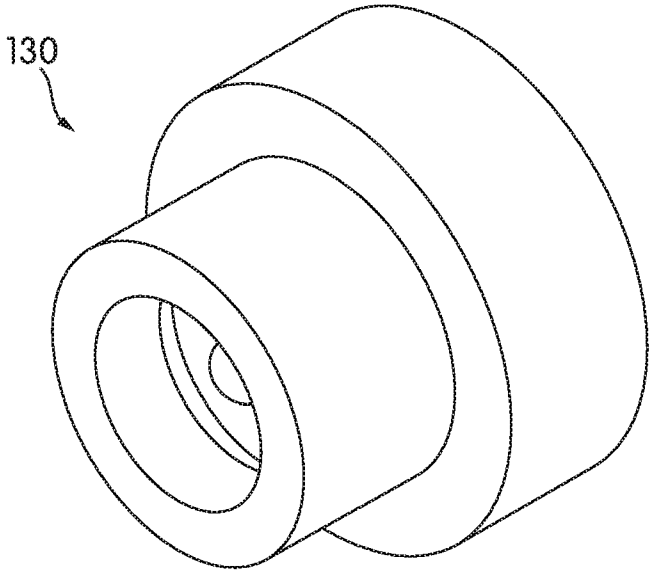


FIG. 6a

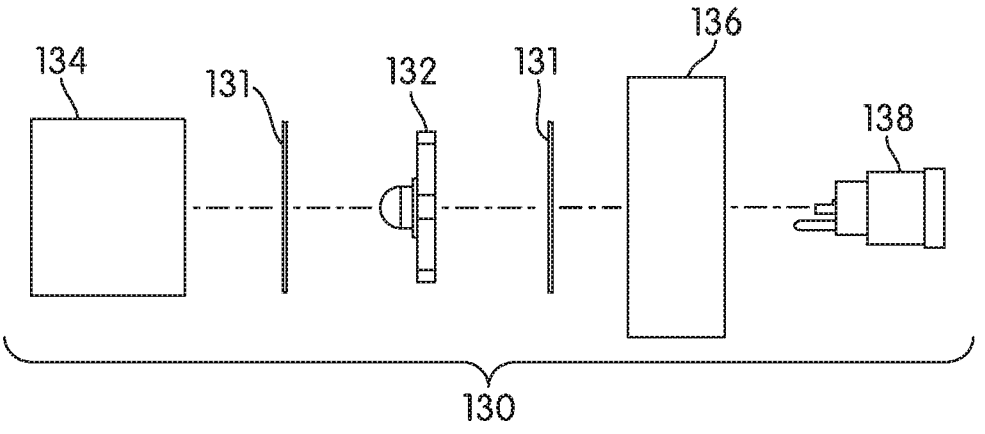


FIG. 6b

ADAPTOR FOR MICROSCOPES

FIELD

[0001] The present disclosure relates to an adaptor for an objective lens of a microscope and, more particularly, to an adaptor that converts an ordinary microscope into a fluorescent microscope.

BACKGROUND

[0002] Fluorescent Microscopy (FM) is a microscopy technique that utilizes fluorescent chromophores to detect several target substrates. These substrates include many causes of infectious diseases, including the malaria parasites and *Mycobacterium tuberculosis,* the causative agent of *tuberculosis.*

[0003] Utilization of FM for the detection and diagnosis of such diseases has been shown to be much more sensitive and specific than corresponding microscopic methods utilizing conventional light microscopes. Reducing the incidence of such diseases by incorporating methods such as FM has become the goal of many world health organizations.

[0004] In the past, fluorescent microscopes have been unavailable to a large percentage of microscopists. In a large number of laboratories, the technology is not feasible due to high capital costs, expensive and dangerous light sources, training requirements, delicate instrumentation and lack of appropriate infrastructure. However, with the advancement of LED based fluorescent systems, which eliminates some of these problems, FM technology has started to become more prevalent.

[0005] There have been several devices that can be used to retrofit existing bright field microscopes and transform them into fluorescent microscopes. One such exemplary adaptor for microscopes is described in U.S. Pat. No. 5,198,927, the content of which is incorporated by reference herein. However, this and other prior adaptors can be cumbersome to attach and further lack the ability to readily change filter sets when the microscopic application changes.

[0006] These and other drawbacks are present in current fluorescent microscopes and adaptors.

SUMMARY

[0007] Exemplary embodiments are directed to a fluorescent microscope attachment designed for easy attachment to a conventional microscope, easy changing of microscope objective lenses, and which allow for the easy changing and interchanging of filter sets depending on the application.

[0008] According to various aspects of the disclosure, an adaptor for converting a conventional, non-fluorescent light microscope into a fluorescent microscope is described.

[0009] The adaptor comprises a body member configured at one end thereof to attach to a body tube of the microscope and configured at an opposite end thereof to attach to a microscope objective lens, the body tube further having an opening formed in a side thereof and a filter arm assembly insertable into the opening of the body member such that the filter arm assembly is removably attached to the body member. The filter arm assembly has a light path therethrough that intersects an axial light path through the body tube to the objective lens, the filter arm assembly further comprising a filter cube for fluorescent microscopy disposed therein.

[0010] In one embodiment, the adaptor comprises a body member configured at one end thereof for detachably coupling directly to a body tube of the microscope and configured at another end thereof for magnetically coupling to a microscope objective lens, the body member having an axial light path running longitudinally therethrough, the body member including an opening in a radial direction relative to the longitudinal dimension of the body member; a filter arm assembly slidably insertable into the opening of the body member in a single orientation such that the filter arm assembly has a radial light path which intersects the axial light path, the filter arm assembly being magnetically attached to the body member; and a light source removably attached to an end of the filter arm assembly opposite the body member, the light source comprising an LED and disposed to emit light from the LED along the radial light path. The filter arm assembly further comprises a first filter disposed in the radial light path downstream of the light source for passing light at wavelengths which excite fluorescence in a specimen to be examined in the microscope and for blocking light at wavelengths where visible fluorescence emission occurs in the specimen, a reflector disposed at the intersection of the axial light path and radial light path, the reflector passing light through the axial light path and reflecting light at excitation wavelengths, and a second filter disposed in the axial light path and disposed between the reflector and the eye piece, the second filter blocking light at wavelengths shorter than the emission wavelength of a fluorophore used with a specimen being examined and which wavelengths pass through the reflector.

[0011] According to another aspect of the disclosure, an adaptor kit for converting a conventional, non-fluorescent light microscope into a fluorescent microscope comprises a first filter arm assembly removably insertable into a side opening of a body member configured to attach to a body tube of the microscope and configured at an opposite end thereof to attach to a microscope objective lens, the first filter arm assembly having a light path therethrough that intersects an axial light path through the body member extending from the body tube to the objective lens, the filter arm assembly further comprising a first filter cube for fluorescent microscopy disposed therein associated with a first predetermined wavelength; and a second filter arm assembly removably insertable into the side opening of the body member, the second filter arm assembly having a light path therethrough that intersects the axial light path through the body member, the second filter arm assembly further comprising a second filter cube for fluorescent microscopy disposed therein associated with a second predetermined wavelength.

[0012] According to another aspect of the disclosure, a method of adapting a conventional, non-fluorescent microscope into a fluorescent microscope includes providing an adaptor as described herein, attaching the body member of the adaptor to the objective lens, and attaching the body member to the body tube of the microscope.

[0013] In various aspects, a manual of operation and instruction for use for the apparatus consistent with article of manufacture may be provided.

[0014] Some further advantages and embodiments may become evident from the attached drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0015] FIG. **1** is a side elevational view of a microscope including an adaptor according to various aspects of the disclosure.

[0016] FIG. **2** depicts a perspective view of an adaptor in accordance with an exemplary embodiment.

[0017] FIG. **3** depicts an unassembled view of the adaptor shown in FIG. **2**.

[0018] FIGS. **4***a* and **4***b* depict a perspective and exploded view, respectively, of a filter arm assembly in accordance with an exemplary embodiment.

[0019] FIGS. **5***a* and **5***b* depict a perspective and exploded view, respectively, of a body member in accordance with an exemplary embodiment.

[0020] FIGS. **6***a* and **6***b* depict a perspective and exploded view, respectively, of a light source in accordance with an exemplary embodiment.

[0021] Where like parts appear in more than one drawing, it has been attempted to use like reference numerals for clarity.

DETAILED DESCRIPTION OF EXEMPLARY EMBODIMENTS

[0022] Exemplary embodiments are directed to an improved fluorescent microscope adaptor to turn a conventional light microscope into a fluorescent microscope. Exemplary embodiments provide a modular, user-friendly adaptor that can be used to upgrade conventional microscopes to a fluorescent microscope and thereby increase the range of applications available to the microscopist. The adaptor can further eliminate the need for complex and expensive traditional fluorescent microscopes and thereby provide opportunities for implementation of fluorescence microscopy in areas of the world without the means or the infrastructure to utilize traditional fluorescent devices.

[0023] Exemplary embodiments provide an adaptor that permits easy interchangeability of filter sets by providing a filter arm assembly that can readily be removed from the adaptor and replaced with another without removing the adaptor from the microscope. Exemplary embodiments can further exhibit improved durability, can provide a brighter, more robust light source, and further allow for ready interchanging of objective lenses so that the magnification power can easily and conveniently be adjusted without removing the adaptor from the microscope.

[0024] Devices in accordance with the teachings herein provide a more modular and user-friendly design for the microscopist. Moreover, the manufacturing process can be improved by providing components that are more easily and reliably assembled.

[0025] Referring now to FIG. **1**, an adaptor **100** in accordance with an exemplary embodiment is shown installed on a conventional microscope **10** having an eye piece **12**, a body tube **14**, and a specimen holder **16**. The adaptor **100** includes a filter arm assembly that may contain all of the filters/reflector (i.e., the entire filter cube) used for a particular operation and a body member that attaches the adaptor **100** to the microscope **10** and which receives the filter arm assembly. The adaptor **100** may also include a microscope objective lens of desired magnification. In some embodiments, the adaptor also includes a light source that attaches to the filter arm and provides incident light to the epi-fluorescent or other fluorescent system. As a result, providing an adaptor **100** in accordance with exemplary embodiments having the desired filter sets and a matching light source allows a user to turn most conventional microscopes into fluorescent microscopes for a particular desired application.

[0026] Turning to FIG. **2**, the adaptor **100** includes a body member **110** and a filter arm assembly **120** releasably attached to the body member **110**, the filter arm assembly **120** being readily interchangeable depending on the filter set needed for a particular application. As also shown in FIG. **2**, the adaptor **100** may include a light source **130** attached to the filter arm assembly **120**. In some embodiments, the light source **130** and filter arm assembly **120** may be permanently attached.

[0027] As seen in FIGS. **2** and **3**, the adaptor **100** may also include an objective lens **140** attached to the body member **110**. The objective lens **140** may be configured to work in cooperation with the adaptor **100** including, for example, having a quick change feature **142**, such as a magnet, that permits multiple different objective lenses of different magnification to be quickly and easily substituted during use.

[0028] The filter arm assembly **120** is insertable into the body member **110**. Magnets may be used to attach the two assemblies **120**, **110** with respect to one another so that they are secured together, but can readily be detached and the filter arm assembly may be removed; any other suitable manner of releasably connecting the two assemblies **120**, **110** may also be employed. The body member **110** includes a coupling assembly by which it may be attached to the microscope body tube **14**, such as, for example, by threading the adaptor thereto in place of the directly attached objective lens as used in conventional microscopy. The body member **110** may also include a second coupling assembly by which the objective lens **140** may in turn be attached to the adaptor **100** via the body member **110** by, for example, a magnetic attachment, or other suitable attachment mechanism that preferably does not involve rotation of the objective lens as part of the attachment, although the use of threading to attach the objective lens **140** to the body member **110** is also contemplated.

[0029] The filter arm assembly **120** is shaped complementary to a filter arm insertion opening **112** of the body member **110** to be received therein. The shape may be of a keyed geometry to ensure proper orientation of the filters contained within the filter arm assembly **120** with respect to the body member **110** for correct microscope operation. Proper filter orientation is obtained when the barrier (emission) filter (as described below) is inserted into the body member **110** such that the barrier filter is at the top of the opening **112**.

[0030] The filter arm assembly **120** defines a light path therethrough that intersects an axial light path formed in the body member **110** that extends from the body tube **14** of the microscope **10** to the objective lens **140**, with the light path through the filter arm assembly **120** being radial with respect to the body member **110**. The filter arm assembly **120** may include the light source **130** disposed at one end to emit light along the light path through the filter arm assembly **120** and ultimately through the axial light path of the body member **110** to enable viewing of the specimen via the eye piece **12** by a user of the microscope **10**. The light source **130** may be removable from or permanently affixed to the filter arm assembly **120**.

[0031] The filter arm assembly **120** includes a first filter disposed in the radial (with respect to the body member) light path downstream of the light source **130** for passing light at wavelengths which excite fluorescence in a specimen to be examined using the microscope **10** and for blocking light at wavelengths where visible fluorescence emission occurs in the specimen. The filter arm assembly **120** may include a reflective filter (e.g., a dichroic mirror or beam splitter) disposed at the intersection of the axial light path and radial light path, the reflector also acting as a filter such that excitation

wavelengths are reflected toward the specimen through the objective lens while others wavelengths pass through without reflection. An additional filter is disposed in the axial light path between the reflector and the eye piece. The second filter is an emission filter that blocks light at wavelengths shorter than the emission wavelength of the fluorophore used in the specimen and which pass through the reflector.

[0032] Turning to FIGS. **4***a* and **4***b*, the filter arm assembly **120** is shown. The assembly **120** includes an appropriately sized lens **121**, spring **122** and the first filter **123**, an excitation band pass filter (also sometimes simply referred to as an excitation filter) of a pre-determined specification for a particular application, all of which are disposed between a barrel **124** and a reflector holder **125**. The barrel **124** and reflector holder **125** are secured together. This may be accomplished, for example, with an appropriate amount of adhesive or in any other suitable manner. The barrel **124** includes an opening at its distal end that serves as an entrance to the light path passing through the filter assembly **120**. The opening can receive, for example, light entering the barrel **124** from a light source **130** mounted on the filter arm assembly **120** (as seen in FIG. **2**).

[0033] A reflector **126**, such as a dichroic mirror, beam splitter or other reflective filter that reflects certain wavelengths of light while allowing others to pass through, of an appropriate pre-determined specification is positioned at an approximately 45 degree angle from horizontal and situated between the reflector holder **125** and a magnet holder **127** that together make up a filter arm housing. The magnet holder **127** is secured to the reflector holder **125** to enclose the reflector **126**. The two holders **125**, **127** may be secured to one another in any suitable manner; in one embodiment, four spring pins **128** are used. A barrier filter **129** of an appropriate pre-determined specification is attached to the top of the magnet holder **127**, for example, by using adhesive. A magnet **115** may be attached to the magnet holder **127**, again using any suitable method, including an adhesive. The magnet **115** may be used to retain the filter arm assembly **120** to the body member **110**, for example, in conjunction with a corresponding magnet **115** positioned within the body member **110**.

[0034] As previously noted, the end of the filter arm assembly **120** opposite the barrel **124** can be configured with a one-way geometry or other keying feature to ensure proper orientation of the filter cube components **123**, **126**, **129** within the assembly **120** when the filter arm assembly **120** is inserted into the body member **110** for attachment to the microscope **100**.

[0035] For example, the end of the filter arm assembly **120** could be flat on top and rounded on the bottom such that it can only be inserted into the matching shape of the filter arm insertion opening **112** of the body member **110** in one orientation, thereby ensuring proper orientation of the filter set inside the filter assembly **120**. In this way, the filters **123**, **126**, **129** can be consistently and repeatably installed in the correct manner to ensure proper function during use.

[0036] An adaptor **100** in accordance with exemplary embodiments may allow the user to remove the filter arm assembly **120** containing a first set of filters and replace it with another filter arm assembly having a different set of filters to accommodate the requirements of a different particular desired application such as, for example, where a sample having a different fluorophore is under examination. That is, different filter arm assemblies **120** may contain a filter cube with a different series of three filters already fixed in the proper alignment and orientation that can be interchanged depending upon a particular predetermined application. In some embodiments, a kit may be provided that comprises a first filter arm assembly having a first set of filters and one or more additional filter arm assemblies, each having a different set of filters. In some embodiments, the kit may further comprise a plurality of different light sources **130** of different wavelengths, each of which may be matched for use with one or more filter assemblies.

[0037] Still referring to FIGS. **4***a* and **4***b*, in each case, the first filter **123** is an excitation filter **123** (also referred to as a band pass filter) having a pre-determined wavelength cutoff and installed inline with the incident light beam entering the barrel **124**. The second filter/reflector **126** may be a dichroic mirror, beam splitter or other reflective filter of a pre-determined wavelength cutoff and mounted at an approximately 45° angle from the incident light beam. Wavelengths of light below this cutoff are reflected through the microscope objective lens **140** to illuminate the sample. Wavelengths of light above the cutoff pass through the reflector **126** without interruption. The third filter **129** is a barrier filter of the desired wavelength, sometimes referred to as an emission band pass filter, installed between the reflector **126** and the user.

[0038] The filter arm assembly **120** also contains the focusing lens **121** inline with the incident light beam between the light source and the excitation filter **123**. The focusing lens **121** focuses the incident light beam onto the dichroic mirror **126**. Additionally, a spring **122** or other retention device may be provided to hold the focusing lens **121** in proper alignment with the light beam.

[0039] A benefit of a filter arm assembly **120** in accordance with exemplary embodiments is that all three filter components for a fluorescent microscopy operation (sometimes referred to as a filter cube) are present in a single apparatus and these filters are installed a permanent way that ensures the proper alignment of the filters and the light path in a consistent and repeatable manner. As long as the proper excitation bandpass, dichroic mirror and emission band pass filters are selected for a predetermined application of interest and the filters are installed properly, an infinite number of filter combinations can be produced to match any desired application.

[0040] Yet another benefit of an adaptor in accordance with exemplary embodiments is that the light shaft can be extended to any desired length within the focusing limits of the lenses used. Accordingly, fluorescent microscope adaptors **100** in accordance with exemplary embodiments may be used in situations where conventional adaptors have been unusable because of size and/or space constraints. Extension of the light shaft could allow the device to be modified to be used in these situations. For example, the user can add a fiber-optic cable of desired length extending between the LED light source and the filter arm assembly and, if necessary, change the lens set in the LED light source to maintain proper focus and intensity of the desired wavelength of light. This can add greater flexibility and allow use of the adaptor on space constrained microscopes, such as with inverted microscopes. This further allows the fluorescent microscope adaptor **100** to be used for almost any desired application.

[0041] Additionally, to ensure proper orientation, the teachings also provide a means for the complete insertion of the filter arm into the body member. This may be accomplished by the use of a magnet installed on the end of the filter arm distal from the light input opening and a complementary magnet installed inside the body member inline with the filter

arm insertion shaft. When installed properly, the magnets will attract and ensure complete installation and alignment of the filters and the light path.

[0042] Another benefit of exemplary embodiments is that adhesive use can be reduced, including, for example, by connecting the portions **125**/**127** of the filter arm assembly **120** that house the reflector **126** with a series of pins **128**. The use of adhesive can make proper alignment of the reflector difficult. Furthermore, adhesive residue can affect the quality and the operation of the apparatus. By using pins **128** to secure portions of the filter arm assembly **120**, proper alignment becomes easier, installation cleaner, and provides a more efficient manufacturing process.

[0043] FIGS. **5***a* and **5***b* depict the body member **110**. The body member **110** has an axial light path running longitudinally therethrough and includes the filter arm assembly opening **112** formed in a radial direction relative to the longitudinal dimension of the body member to receive the filter arm assembly **120**.

[0044] The body member **110** includes a coupling assembly for coupling the body member **110** (and thus the adaptor **100**) to the microscope **10**. The coupling assembly may include an optional retainer ring **113** and a microscope threading ring **114** with appropriate threading to connect the main barrel **116** of the body member **110** to the microscope **10**. The threading ring **114** may be attached to the main barrel **116** in any suitable manner, including the use of an adhesive and/or a set screw **117**. A magnet **115** may be attached to the inside of the main barrel **116** of the body member **110**, the magnet **115** positioned to be attracted to a corresponding magnet **115** in the filter arm assembly **120** and thereby retain the filter arm assembly **120** at its proper location within the body member **110**. As previously described, the body member **110** includes a filter arm insertion opening **112** configured to receive the filter arm assembly **120**.

[0045] The body member **110** includes a coupling assembly on the underside of the main barrel **116** for attachment of the objective lens **140**. This may include the use of threading to attach the objective lens **140** to the body member **110**. Alternatively, the main barrel **116** may be metallic and/or have a magnet disposed on its underside to attach to the objective lens **140**. In addition, the body member **110** and/or the objective lens **140** may comprise a magnetic material. As a result, the objective lens **140** can be attached or removed from the body member **110** without the need for threading, avoiding rotation of the objective lens **140**. Furthermore, the use of a magnetic attachment for the objective lens **140** to the body member **110** allows for a more user-friendly assembly process and also allows for easily switching between objective lenses of two or more different magnifications, a technique routinely used by microscopists.

[0046] According to yet another embodiment, a light source **130** is provided as part of the adaptor **100** that can be permanently or removably attached to the filter arm assembly **120**. In one embodiment, the light source **130** is an LED source containing an LED bulb. The use of an LED provides a brighter, more robust light source. Advantageously, because the driver board, rheostat and power source that control bulb operation can be used for multiple different light sources, these components can be omitted from the light source **130** and be separately connected to the light source **130**. As a result of omitting these components, the light source **130** can be made smaller and more convenient to the user for direct attachment to the adaptor **100**, while still permitting the filter arm assembly **120** and/or light source **130** to be interchanged for different applications. In embodiments in which the light source **130** is removably attached to the filter arm assembly **120**, light sources having LEDs of different wavelengths can also be readily interchanged with respect to a single filter arm assembly **120** depending upon the application.

[0047] As shown in FIGS. **6***a* and **6***b*, the light source **130** includes one or more LED bulbs **132** of appropriate output situate between two retainer rings **131**, all contained within LED housing **134**. The LED housing **134** is attached to an electrical connection housing **136**, to which an appropriate electrical connection **138** is attached. The electrical connection **138** is in electrical communication with the LED bulb(s) **132** and can further be connected by a cable, for example, to the driver board, rheostat and power source (not shown) to operate the bulb **132** in a desired manner.

[0048] It will be appreciated that various parts of the adaptor may be made of plastic, metal or other suitable materials. Furthermore, where parts are described as optionally being assembled using an adhesive, commercially available adhesive agents, such as those available under the trademark LOCTITE, may be used, for example, to secure certain filters into the proper position.

[0049] The section headings used herein are for organizational purposes only and are not to be construed as limiting the subject matter described in any way.

[0050] It will be apparent to those skilled in the art that various modifications and variations can be made to the adaptor for microscopes of the present disclosure without departing from the scope of the invention. Other embodiments of the invention will be apparent to those skilled in the art from consideration of the specification and practice of the invention disclosed herein. It is intended that the specification and examples be considered as exemplary only.

What is claimed is:

1. An adaptor for converting a conventional, non-fluorescent light microscope into a fluorescent microscope, the adaptor comprising:

a body member configured at one end thereof to attach to a body tube of the microscope and configured at an opposite end thereof to attach to a microscope objective lens, the body tube further having an opening formed in a side thereof;

a filter arm assembly insertable into the opening of the body member such that the filter arm assembly is removably attached to the body member, the filter arm assembly having a light path therethrough that intersects an axial light path through the body member extending from the body tube to the objective lens, the filter arm assembly further comprising a filter cube for fluorescent microscopy disposed therein.

2. The adaptor of claim **1**, wherein the filter arm assembly is keyed to be insertable into the body member in a single orientation.

3. The adaptor of claim **1**, wherein the filter arm assembly is magnetically attachable to the body member.

4. The adaptor of claim **1**, wherein the filter cube comprises an excitation band pass filter, a dichroic mirror, and a barrier filter associated with a predetermined wavelength.

5. The adaptor of claim **4**, further comprising a focusing lens and spring disposed within the filter arm assembly.

6. The adaptor of claim **4**, wherein spring pins secure the dichroic mirror within the filter arm assembly.

7. The adaptor of claim **1**, wherein the objective lens is detachably coupled to the body member.

8. The adaptor of claim **7**, wherein the objective lens is magnetically attached to the body member.

9. The adaptor of claim **1**, further comprising a light source attached to the filter arm assembly.

10. The adaptor of claim **9**, wherein the light source comprises an LED.

11. The adaptor of claim **10**, wherein the light source further comprises an electrical connection for electrically connecting the light source to a driver board, rheostat and power source.

12. The adaptor of claim **9**, wherein the light source is removably attached to the filter arm assembly.

13. An adaptor for converting a conventional, non-fluorescent light microscope into a fluorescent microscope, the adaptor comprising:

a body member configured at one end thereof for detachably coupling directly to a body tube of the microscope and configured at another end thereof for magnetically coupling to a microscope objective lens, the body member having an axial light path running longitudinally therethrough, the body member including an opening in a radial direction relative to the longitudinal dimension of the body member;

a filter arm assembly slidably insertable into the opening of the body member in a single orientation such that the filter arm assembly has a radial light path which intersects the axial light path, the filter arm assembly being magnetically attached to the body member;

a light source removably attached to an end of the filter arm assembly opposite the body member, the light source comprising an LED and disposed to emit light from the LED along the radial light path;

the filter arm assembly further comprising

a first filter disposed in the radial light path downstream of the light source for passing light at wavelengths which excite fluorescence in a specimen to be examined in the microscope and for blocking light at wavelengths where visible fluorescence emission occurs in the specimen;

a reflector disposed at the intersection of the axial light path and radial light path, the reflector passing light through the axial light path and reflecting light at excitation wavelengths; and

a second filter disposed in the axial light path and disposed between the reflector and the eye piece, the second filter blocking light at wavelengths shorter than the emission wavelength of a predetermined fluorophore used in a sample under examination and which wavelengths pass through the reflector.

14. An adaptor kit for converting a conventional, non-fluorescent light microscope into a fluorescent microscope, the kit comprising:

a first filter arm assembly removably insertable into a side opening of a body member configured to attach to a body tube of the microscope and configured at an opposite end thereof to attach to a microscope objective lens, the first filter arm assembly having a light path therethrough that intersects an axial light path through the body member extending from the body tube to the objective lens, the filter arm assembly further comprising a first filter cube for fluorescent microscopy disposed therein associated with a first predetermined wavelength; and

a second filter arm assembly removably insertable into the side opening of the body member, the second filter arm assembly having a light path therethrough that intersects the axial light path through the body member, the second filter arm assembly further comprising a second filter cube for fluorescent microscopy disposed therein associated with a second predetermined wavelength.

15. A method of adapting a conventional, non-fluorescent microscope into a fluorescent microscope, said conventional microscope comprising a vertical body tube, an eye piece disposed at one end of said body tube, an objective lens disposed at another end of said body tube, and a means for retaining a specimen plate under said objective lens, the method comprising the steps of:

providing the adaptor of claim **1**;

attaching the body member to the objective lens; and

attaching the body member to the body tube of the microscope.

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