detail below. Further, an ITO layer 306 is formed on the semi-reflecting mirror 304. In some embodiments, the ITO layer 306 is about 100 nm thick.

**[0019]** A hole transport layer 308 is formed on the ITO layer 306. In some embodiments, the hole transport layer 308 includes a 1,1-bis[(di-4-tolylamino)phenyl]cyclohexane (TAPC) layer, which may be about 50 nm thick. An emitting layer 310 is formed on the hole transport layer 308. The material included in the emitting layer 310 determines the color (or the spectral frequencies) of the light emitted by the microcavity OLED 300. For example, for a microcavity OLED 300 that emits red light in the range of, *e.g.*, about 585 nm to about 675 nm, the emitting layer 310 may include 3,5'-N,N'-dicarbazole-benzene ("mCP") doped with ~~tris(2-phenylisoquinoline)iridium ("Ir(piq)$_2$")~~ tris(1-phenylisoquinoline)iridium ("Ir(piq)$_3$"). Similarly, for a microcavity OLED 300 that emits green light in the range of, *e.g.*, about 525 nm to about 655 nm, the emitting layer 310 may include mCP doped with fac-tris(2-phenylpyridinato)iridium(III) ("Ir(ppy)$_3$"). Likewise, for a microcavity OLED 300 that emits blue light in the range of, *e.g.*, about 435 nm to about 540 nm, the emitting layer 310 may include 3,5'-N,N'-dicarbazole-benzene (mCP):Iridium(III)bis[(4,6-di-flourophenyl)-pyridinato-N,C2'] picolinate ("FIrpic").

**[0020]** An electron transport layer 312 is formed on the emitting layer 310. The electron transport layer 312 may include 2,9-dimethly-4,7-diphenyl-1, 10-phenanthroline (BCP) layer and/or a tris[3-(3-pyridyl)-mesityl]borane ("3TPYMB") layer. Further, a cathode 314 is formed on the electron transport layer 312. The cathode 314 includes a metal layer. For example, the cathode 314 may include cesium carbonate ($CsCO_3$) (about 1 nm thick) and aluminum (Al) (about 100 nm thick) or lithium fluoride (LiF) (about 1 nm thick) and Al (about 100 nm thick). FIG. 4 is a diagram of another non-limiting embodiment of a microcavity OLED 300 that emits blue light. In the embodiment illustrated in FIG. 4, the cathode 314 includes an aluminum (Al) layer 414a, which is about 100 nm thick, and a LiF layer

## CLAIMS

~~Therefore, at least the following is claimed:~~

1. A white-light source, comprising:

a first microcavity organic light emitting diode (OLED) configured to emit a narrow spectrum of blue light;

a second microcavity OLED configured to emit a narrow spectrum of green light, and

a third microcavity OLED configured to emit a narrow spectrum of red light; and~~,~~ wherein the blue light emitted by the first OLED, green light emitted by the second OLED and red light emitted by the third OLED combine to produce white illuminating light with a color rendering index that is greater than 80.

2. The white-light source of claim 1, wherein the blue light includes an intensity corresponding to a wavelength substantially within a range of about 435 nm to about 540 nm, the green light includes an intensity corresponding to a wavelength substantially within a range of about 525 nm to about 655 nm, and the red light includes an intensity corresponding to a wavelength substantially within a range of about 585 nm to about 675 nm.

3. The white-light source of claim 2, wherein the blue light includes a peak intensity corresponding to a wavelength substantially within a range of about 450 nm to about 480 nm, the green light includes a peak intensity corresponding to a wavelength substantially within a range of about 530 nm to about 575 nm, and the red light includes a peak intensity corresponding to a wavelength substantially within a range of about 620 nm to about 650 nm.

4. The white-light source of claim 1, wherein the first microcavity OLED, the second microcavity OLED, and the third microcavity OLED are each disposed on a common glass substrate.

5. The white-light source of claim 4, wherein the red light, green light, and blue light are emitted ~~is~~ substantially orthogonal to the common glass substrate.

6. A light source, comprising:

a plurality of organic light emitting diode (OLEDs) disposed on a glass substrate, wherein each of the plurality of OLEDs is configured to emit light in one of a plurality of respective colors substantially orthogonal to the glass substrate in a predefined spectrum, wherein the light emitted in the plurality of respective colors by the plurality of OLEDs is combined to produce white illuminating light with a color rendering index that is greater than 80, wherein each of the plurality of OLEDs comprises:

a semi-reflecting mirror; and

an emitting layer, wherein the emitting layer in each OLED of the plurality of OLEDs corresponds to ~~a~~the one respective color of light emitted by the OLED.

7. The light source of claim 6, wherein the semi-reflecting ~~layer~~mirror includes a quarter wave stack.

8. The light source of claim 6, wherein the semi-reflecting ~~layer~~mirror includes a layer having a low refractive index formed on a layer having a high refractive index.

9. The light source of claim 6, wherein the semi-reflecting ~~layer~~mirror includes a plurality of silicon dioxide layers alternating with a plurality of titanium dioxide layers.

10. The light source of claim 6, wherein the semi-reflecting ~~layer~~mirror includes a silver film.

11. The light source of claim 6, wherein each of the plurality of OLEDs further comprises:

a cathode formed on an electron transport layer, wherein the electron transport layer is formed on the emitting layer;

a hole transport layer formed on an indium tin oxide (ITO) layer, wherein the emitting layer is formed on the hole transport layer; and

wherein the ITO layer is formed on the semi-reflecting mirror.

12. The light source of claim 11, wherein the electron transport layer ~~includes~~ includes a 2,9-dimethly-4,7-diphenyl-1, 10-phenanthroline (BCP) layer or a tris[3-(3-pyridyl)-mesityl]borane ("3TPYMB") layer.

13. The light source of claim 11, wherein the cathode includes cesium carbonate ($CsCO_3$) and aluminum (Al) or lithium fluoride (LiF) and Al.

14. The light source of claim 11, wherein the hole transport layer includes a 1,1-bis[(di-4-tolylamino)phenyl]cyclohexane (TAPC) layer adjacent to the emitting layer and a PEDOT:PSS layer adjacent to the ITO layer.

15. The light source of claim 6, wherein the emitting layer of a first OLED included in the plurality of OLEDs includes 3,5'-N,N'-dicarbazole-benzene ("mCP") doped with ~~tris(2-phenylisoquinoline)iridium ("Ir(piq)$_3$")~~ tris(1-phenylisoquinoline)iridium ("Ir(piq)$_3$").

16. The light source of claim 15, wherein the emitting layer of a second OLED included in the plurality of OLEDs includes mCP doped with fac-tris(2-phenylpyridinato)iridium(III) ("Ir(ppy)$_3$").

17. The light source of claim 16, wherein the emitting layer of a third OLED included in the plurality of OLEDs includes mCP:Iridium(III)bis[(4,6-di-flourophenyl)-pyridinato-N,C2'] picolinate ("FIrpic").

18. The light source of claim 6, wherein ~~each of the OLEDs includes a microcavity defined by the semi-reflecting mirror and a cathode~~ the light source producing the white illuminating light has an overall efficiency of 150 lm/W or more.