CLAIMS

What is claimed is:

1. A bending-resistant multimode fiber with a large core diameter and a high numerical aperture, comprising:

a core; and

a cladding surrounding the core;

wherein

the radius R1 of the core is in a range of 28 to 50 microns, the refractive index profile n(r) of the core has a parabolic shape ~~according to the following exponent function:~~

~~$n^2(r) = n_1^2[1 - 2\Delta(\frac{r}{R1})^{\alpha}]$ for r < R1~~

~~with r being the distance from the central axis of the fiber~~, the exponent α being a parameter in a range of 1.9 to 2.2, ~~Δ being the relative refractive index difference between the core and the cladding;~~

and

the maximum relative refractive index difference in the core Δ1%max is in a range of 2.15% to 2.5%; and

the cladding comprises an inner cladding and/or a trench cladding, and an outer cladding disposed from the inner to the outer in sequence, wherein the inner cladding has a radius R2 in a range of 28 to 55 microns, and a relative refractive index difference Δ2% in a range of -0.1% to 0.1%, and wherein the trench cladding has a radius R3 in a range of 28 to 60 microns, and a relative refractive index difference Δ3% in a range of -0.15% to -0.8%;

~~the expression "relative refractive index difference" of a part of the fiber (Δ1%max, Δ2% and Δ3%, Δ4%) referring to the following formula:~~

~~$$\Delta\% = \left[\frac{\left(n_i^2 - n_0^2\right)}{2n_i^2}\right] \times 100\% \approx \frac{n_i - n_0}{n_0} \times 100\%$$~~

~~where n_i and n_0 are respectively the refractive index of the corresponding part of the fiber and of pure silica glass at a wavelength of about 850 nm.~~

wherein it has a numerical aperture in a range of **0.304 to 0.33**~~.~~;

wherein for the fiber at the wavelength of 850 nm, a bending loss resulted winding the fiber two turns at a bend radius of 7.5 millimeters is less than or equal to 0.35 dB; the bending loss resulted by winding the fiber two turns at the bend radius of 15 millimeters is less than or equal to 0.2 dB; and the bending loss by winding the fiber 100 turns at the bend radius of 30 millimeters is less than or equal to 0.2 dB.

2. The bending-resistant multimode fiber according to claim 1, wherein the outer cladding surrounds the trench cladding, wherein a radius R4 of the outer cladding is in a range of 60 to 65 microns, and a relative refractive index difference Δ4% of the outer cladding is in a range of -0.1% to 0.1%.

3. The bending-resistant multimode fiber according to claim 1 or 2, wherein the relative refractive index difference Δ3% of the trench cladding is radially constant or radially gradual changed, wherein the gradual change of the relative refractive index difference Δ3% comprises a gradual change in an ascending order from inside to outside or a gradual change in a descending order from inside to outside.

4. The bending-resistant multimode fiber according to claim 1 or 2, wherein the core and the claddings are made of Ge-doped, F-doped, Ge-F-doped or pure quartz glass.

5. The bending-resistant multimode fiber according to claim 1 or 2, having a bandwidth of 200 MHz-km or over 200 MHz-km at a wavelength of 850 nm.

6. The bending-resistant multimode fiber according to claim 1 or 2, having a bandwidth of 200 MHz-km or over 200 MHz-km at a wavelength of 1300 nm.

~~7. The bending-resistant multimode fiber according to claim 1 or 2, wherein for the fiber at the wavelength of 850 nm, a bending loss resulted by winding the fiber two turns at a bend radius of 7.5 millimeters is less than or equal to 0.35 dB; the loss resulted by winding the fiber two turns at the bend radius of 15 millimeters is less than or equal to 0.2 dB; and the bending loss resulted by winding the fiber 100 turns at the bend radius of 30 millimeters is less than or equal to 0.2 dB.~~