CLAIMS

1.- A waveguide (100) comprising a plurality of sections of a core material (110) and a plurality of sections of a covering material (120) alternately arranged in a periodic way with a period (Λ) smaller than a~~the~~ wavelength (λ) of a light guided through the waveguide (100);

characterised by the waveguide (100) being~~characterised in that it is~~ single mode, the waveguide (100) comprising ~~and comprises~~ interfaces respectively defined between each one of the sections of the plurality of sections of core material (110) and each one of the sections of the plurality of sections of covering material (120) forming an angle (α) greater than zero with respect to a plane perpendicular to a propagation direction of the light intended to be guided by the waveguide (100), and the waveguide (100) comprising at least one modal adapter (140) connected to an input of the waveguide (100), said at least one modal adapter (140) comprising a plurality of sections of core material (110) and sections of covering material (120) arranged in an alternated and periodic way with a period (Λ) smaller than a wavelength (λ) of a light guided through the at least one modal adapter (140), and the plurality of sections of core material (110) being arranged with progressive angles between a plane perpendicular to the propagation direction of the guided light and the angle (α). ~~)~~.

2.- The waveguide (100) according to claim 1, characterised in that the angle (α) is selected such that a first effective index (n_{TE}) of a zero-order transverse electric mode (TE_0) is different from a second effective index (n_{TM}) of a zero-order transverse magnetic mode (TM_0).

3.- The waveguide (100) according to claim 1, characterised in that the angle (α) is selected such that a first effective index (n_{TE}) of a zero-order transverse electric mode (TE_0) is equal to a second effective index (n_{TM}) of a zero-order transverse magnetic mode (TM_0).

~~4.- The waveguide (100) according to any of the preceding claims, characterised in that it comprises at least one modal adapter (140) connected to an input of the waveguide (100), said at least one modal adapter (140) comprising a plurality of sections of core material (110) and sections of covering material (120) arranged in an alternated and periodic way with a period (Λ) smaller than the wavelength (λ) of a light guided through~~

~~the at least one modal adapter (140), and the plurality of sections of core material (110) being arranged with progressive angles between a plane perpendicular to the propagation direction of the guided light and the angle (α).~~

~~5~~4.- The waveguide (100) according to any one of the preceding claim~~s 4~~, characterised in that the at least one modal adapter (140) comprises a plurality of central bridges~~attachments~~ (141) of core material that joins the plurality of sections of core material (110) of said modal adapter (140), a~~the~~ width of each central bridge (141) being inversely proportional to the width of the modal adapter (140).

~~5~~6.- The waveguide (100) according to any one of the preceding claims ~~4 and 5~~, characterised in that the sections of core material (210) of the at least one modal adapter (140) have a variable width.

~~6~~7.- The waveguide (100) according to any one of the preceding claims, characterised in that the plurality of sections of core material (110) and the plurality of sections of covering material (120) have constant geometric properties throughout the length of the waveguide (100).

~~7~~8.- The waveguide (100) according to any one of claims 1 to ~~5~~6, characterised in that the plurality of sections of core material (110) and the plurality of sections of covering material (120) have variable geometric properties throughout the length of the waveguide (100).

~~9.- The waveguide (100) according to any one of the preceding claims, characterised in that the plurality of sections of core material (110) have at least one inner groove of covering material.~~

~~10~~8.- The waveguide (100) according to any one of the preceding claims ~~1 to 8~~, characterised in that the plurality of sections of core material (110) have a plurality of central attachments (150) of core material.

~~9~~11.- The waveguide (100) according to any one of the preceding claims, characterised in that a~~the~~ material of the sections of core material (110) is silicon.

1012.- The waveguide (100) according to claim 911, characterised in that athe material of the sections of covering material (120) is silicon dioxide.

1113.- The waveguide (100) according to claim 911, characterised in that the material of the sections of covering material (120) is a polymer with an effective index variation with the temperature value having athe sign opposite to the variation of the silicon of the sections of core material (110).

1214.- The waveguide (100) according to claim 1113, characterised in that athe proportion of covering material with respect to the material of the sections of core material (110) within a period (Λ) is selected such that a variation is minimised with the temperature of athe first effective index (n_{TE}) of a zero-order transverse electric mode (TE_0) and athe second effective index (n_{TM}) a zero-order transverse magnetic mode (TM_0).

13.- A polarisation splitter (200), comprising a first waveguide (210) and a second waveguide (220) adjacently arranged at a distance (d), characterised in that at least the second waveguide (220) is a waveguide (100) comprising a plurality of sections of a core material (110) and a plurality of sections of a covering material (120) alternately arranged in a periodic way with a period (Λ) smaller than the wavelength (λ) of a light guided through the waveguide (100), at least the second waveguide (220) is single mode, and at least the second waveguide (220) comprises interfaces respectively defined between each one of the sections of the plurality of sections of core material (110) and each one of the sections of the plurality of sections of covering material (120) forming an angle (α) greater than zero with respect to a plane perpendicular to a propagation direction of the light intended to be guided by the waveguide (100).

1514.- A The polarisation splitter (200) according to claim 13, ~~comprising a first waveguide (210) and a second waveguide (220) adjacently arranged at a distance (d),~~ characterised in that at least the second waveguide (220) is a waveguide (100) according to any one of claims 1 to 1412.

1516.- The polarisation splitter (200) according to any one of claims 1513 and 14, characterised in that the first waveguide (210) is a continuous waveguide.

16~~17~~.- The polarisation splitter (200) according to any one of claims 13 and 14~~claim 15~~, characterised in that the first waveguide (210) is a waveguide with a plurality of sections of a core material (110) and a plurality of sections of a covering material (120) alternately arranged in a periodic way with a period (Λ) smaller than the wavelength (λ) of the guided light.

17~~18~~.- The polarisation splitter (200) according to any one of claims 14~~15~~ to 16~~17~~, characterised by~~in that it~~ further comprising~~comprises~~ a central structure (230) arranged between the first waveguide (210) and the second waveguide (220).

18~~19~~.- The polarisation splitter (200) according to claim 17~~18~~, characterised in that the central structure (230) is a homogeneous segment of core material.

19~~20~~.- The polarisation splitter (200) according to claim 17~~18~~, characterised in that the central structure (230) is a homogeneous segment of a material different than the core material.

20~~21~~.- The polarisation splitter (200) according to claim 17~~18~~, characterised in that the central structure (230) is a heterogeneous structure that combines multiple materials.

21~~22~~.- A manufacturing method of the waveguide (100) described in any one of claims 1 to 12~~14~~, characterised in that the method~~it~~ comprises, given a core material and a covering material of the waveguide (100), arranging a plurality of sections of core material (110) and a plurality of sections of covering material (120), defining between each one of the sections of core material (110) and each one of the sections of covering material (120) interfaces that respectively form an angle (α) greater than zero with respect to a plane perpendicular to a propagation direction of the light intended to be guided by the waveguide (100).

22~~23~~.- The method according to claim 21~~22~~, characterised in that the angle (α) is determined by means of an~~the~~ approximation of the waveguide (100) making use of a rotated tensor (n), resulting from rotating a diagonal tensor (n) of a homogeneous anisotropic medium.

23~~24~~.- The method according to claim 22~~23~~, characterised in that the method~~it~~ comprises

calculating the rotated tensor ($\tilde{n}$) according to:

$$\tilde{n} = \begin{bmatrix} \tilde{n}_{xx} & 0 & \tilde{n}_{xz} \\ 0 & \tilde{n}_{yy} & 0 \\ \tilde{n}_{xz} & 0 & \tilde{n}_{zz} \end{bmatrix}$$

with:

$$\tilde{n}_{xx} = \sqrt{n_{xx}^2 \cos^2(\alpha) + n_{zz}^2 \sin^2(\alpha)},$$

$$\tilde{n}_{yy} = n_{yy},$$

$$\tilde{n}_{zz} = \sqrt{n_{xx}^2 \sin^2(\alpha) + n_{zz}^2 \cos^2(\alpha)},$$

$$\tilde{n}_{xz} = \sqrt{(n_{zz}^2 - n_{zz}^2) \sin(\alpha) \cos(\alpha)}$$

$[n_{xx}, n_{yy}, n_{zz}]$ being components of the diagonal tensor (n) of the homogeneous anisotropic medium.