Summary

One aspect of the present disclosure relates to a silicate of magnesium and of at least one first element chosen from barium, strontium and calcium, characterized in that it is in the form of a suspension of solid crystallized particles in an organic solvent, said particles having a mean size between 0.1 µm and 1.0 µm, the mean size corresponding to d_{50}, d_{50} being obtained from a distribution in volume of the size of the particles obtained with the laser diffraction technique, the particles containing crystallites with a crystallite size between 45 nm and 200 nm.

Another aspect relates to process for producing a silicate as disclosed herein, characterized in that it comprises the following steps: a liquid mixture comprising compounds of magnesium, of silicium, of at least one first element chosen from barium, strontium and calcium and, possibly, of one second element, is formed; said mixture is spray-dried; the dried product is submitted to a first calcination in air and to a second calcination in a reducing atmosphere; a wet milling operation is carried out on the product after the calcinations.

Another aspect relates to a luminescent device, characterized in that it comprises, or in that it is manufactured from, a silicate as disclosed herein or a silicate obtained by the process as disclosed herein.

Definitions

The term "rare earth" is understood in the present description to mean elements of the group formed by yttrium and the elements of the Periodic Table with atomic numbers between 57 and 71 inclusive.

The mean size and other characteristics of the distribution of size of the particles are obtained by implementing the laser diffraction technique using a laser particle size analyzer. The distribution is given in volume. It can be obtained with a Malvern Mastersizer.

It is specified here that the measurements are performed on suspensions that have not suffered any settling, that is to say with no supernatant and no settled

Claims

1- A silicate of magnesium and of at least one first element chosen from barium, strontium and calcium, characterized in that it is in the form of a suspension of solid crystallized particles in an organic solvent, said particles having a mean size between 0.1 µm and 1.0 µm,

the mean size corresponding to d_{50}, d_{50} being obtained from a distribution in volume of the size of the particles obtained with the laser diffraction technique, the particles containing crystallites with a crystallite size between 45 nm and 200 nm.

2- A silicate as claimed in claim 1 characterized in that the particles have a mean size between 0.1 µm and 0.5 µm.

3- A silicate as claimed in claim 1, characterized in that the particles contains crystallites with a crystallite size between 50 nm and 150 nm.

4- A silicate as claimed in one of the preceding claims, characterized in that it contains at least one additional second element substituting at least one of said first element and of magnesium.

5- A silicate as claimed in one of the preceding claims, characterized in that said first element is partially substituted with at least one second element chosen from rare earths, more particularly europium, and magnesium is partially substituted with at least one second element chosen from zinc, manganese and cobalt.

6- A silicate as claimed in one of the preceding claims, characterized in that it satisfies one of the following formulas :

$AMgSiO_4$
$AMgSiO_4:Eu^{2+}$
$AMgSiO_4:Eu^{2+},Mn^{2+}$
$A_3MgSi_2O_8$
$A_3MgSi_2O_8:Eu^{2+}$
$A_3MgSi_2O_8:Eu^{2+},Mn^{2+}$
$A_2MgSi_2O_7$
$A_2MgSi_2O_7:Eu^{2+}$
$A_2MgSi_2O_7:Eu^{2+},Mn^{2+}$,

in which A is at least one element chosen from barium, strontium and calcium.

7- A silicate as claimed in claim 1, characterized in that it satisfies the following formula :

$Ba_{3(1-x)}Eu_{3x}Mg_{1-y}Mn_ySi_2O_8$

x and y satisfying the following relationships :

$0 < x \leq 1.0$; $0 < y \leq 0.3$ and $x+y \leq 1.2$

8- A silicate as claimed in claim 7, characterized in that x and y satisfy one of the following relationships:

$0.0001 \leq x \leq 0.25$ and $0.0001 \leq y \leq 0.25$; or

$0.01 \leq x \leq 0.25$ and $0.01 \leq y \leq 0.25$; or

$0.01 \leq x \leq 0.15$ and $0.04 \leq y \leq 0.15$; or

$0.99 \leq x \leq 0.11$ and $0.99 \leq y \leq 0.11$; or

$0.018 \leq x \leq 0.022$ and $0.045 \leq y \leq 0.055$.

9- A silicate as claimed in one of the preceding claims, characterized in that the organic solvent is a polar solvent.

10- A silicate as claimed in one of the preceding claims, characterized in that the particles have a distribution index (σ/m) of at most 1.30, particularly at most 1.00, more particularly at most 0.75 and even more particularly at most 0.50,
wherein $\sigma/m = (d_{84}-d_{16})/2d_{50}$ in which:
- d_{84} is the diameter of the particles for which 84% of the particles have a diameter of less than d_{84};
- d_{16} is the diameter of the particles for which 16% of the particles have a diameter of less than d_{16}.

11- A silicate as claimed in one of the preceding claims, characterized in that the suspension is such that there is no sedimentation of the particles over a period of 24 hours.

12- A silicate as claimed in one of claims 1 to 10, characterized in that:
- there is no sedimentation of the particles over a period of 24 hours;
and
- if sedimentation is observed after the period of 24 hours, an agitation using an ultrasonic treatment with a power of 120 W for three minutes makes it possible to deagglomerate the particles.

13- A process for producing a silicate as claimed in one of claims 1 to 12, characterized in that it comprises the following steps:

- a liquid mixture comprising compounds of magnesium, of silicium, of at least one first element chosen from barium, strontium and calcium and, possibly, of one second element, is formed;
- said mixture is spray-dried;
- the dried product is submitted to a first calcination in air and to a second calcination in a reducing atmosphere;
- a wet milling operation is carried out on the product after the calcinations.

14- A process as claimed in claim 13, characterized in that nitrates are used as compounds of magnesium and the aforementioned first and second element.

15- A process as claimed in claim 13 or 14, characterized in that, as silicium element, a sol of silica is used.

16- A process as claimed in one of claims 13 to 15, characterized in that the first calcination is carried out at a temperature between 900°C and 1200°C and the second calcination is carried out at a temperature between 1000°C and 1400°C.

17- A luminescent device, characterized in that it comprises, or in that it is manufactured from, a silicate as claimed in one of claims 1 to 12 or a silicate obtained by the process as claimed in one of claims 13 to 16.