Preparation of Lanthanum Chromate and Lanthanum Chromite Powders by Sol-Gel

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Abstract:
This invention relates to a process for the preparation of a crystalline compound having an empirical formula LaCr[sub]x A[sub]1-x O[sub]4 yH[sub]2 O where A is a metal selected from the group consisting of Mg, Sr, Ca and Ba, x ranges from 0.99 to about 0.7 and y ranges from 0 to 0.15. The process comprises adding a solution of the appropriate metal salts to a solution of ammonium hydroxide thereby precipitating a hydroxide gel intermediate, which is dried and calcined in air to yield the resultant crystalline compound which has a huttonite structure. Additionally, this invention relates to a process for the preparation of a ceramic powder having the empirical formula LaCr[sub]x A[sub]1-x O[sub]3, where A is a metal selected from the group consisting of Mg, Sr, Ca and Ba, and x ranges from 0.99 to about 0.7. Finally, a ceramic composition having the empirical formula LaCr[sub]x A[sub]1-x O[sub]4 yH[sub]2 O having a huttonite structure is also disclosed.

We claim as our invention:

1. A process for the preparation of a ceramic powder precursor having a huttonite structure and having the empirical formula LaCr[sub]x A[sub]1-x O[sub]4.yH[sub]2 O where A is a metal selected from the group consisting of magnesium, strontium, calcium and barium, x ranges from 0.99 to 0.7, and y ranges from 0 to 0.15, said process comprising: a) reacting a solution containing a lanthanum compound, a chromium compound and an A compound, in an atomic ratio of La:Cr:A of 1:x:1-x, with a solution containing a stoichiometric excess of ammonium hydroxide, thereby precipitating a hydroxide gel intermediate; and b) isolating said gel and heating said gel in air at a temperature in the range of from about 400[degree(s)] to about 700[degree(s)] C. for a period of from about 0.5 to about 12 hours, and recovering the resultant ceramic powder precursor. (Main Claim)
2. The process of claim 1 in which said A metal is magnesium.
3. The process of claim 1 in which said A metal is strontium.
4. The process of claim 1 in which said A compound is magnesium nitrate.
5. The process of claim 1 in which said lanthanum compound is a salt selected from the group consisting of lanthanum nitrate, lanthanum chloride and lanthanum acetate.
6. The process of claim 5 in which said lanthanum salt is lanthanum nitrate.
7. The process of claim 1 in which said chromium compound is a salt selected from the group consisting of chromium nitrate, chromium chloride and chromium acetate.
8. The process of claim 7 in which said chromium salt is chromium nitrate.