31.8 ml zinc acetyl acetonate solution (sol. in C_2H_5OH, with the addition of 2 percent acetyl acetone, corr. to 19.2 g ZnO/l)

0.8 g $Ti(OC_4H_9)_4$

0.6 ml Zr $(O—i—C_3H_7)_4$ solution (sol. in isopropanol, corr. to 290 grams ZrO_2 per liter)

3.8 ml $Mg(OCH_3)_2$ solution (sol. in CH_3OH, corr. to 29.4 g MgO/l).

The solution has a pale yellow color and limited stability. It contains the oxides in the following concentrations:

SiO_2	62.00%
Al_2O_3	21.85%
ZnO	6.16%
Li_2O	2.28%
TiO_2	1.77%
ZrO_2	1.77%
BaO	1.61%
MgO	1.11%
CaO	0.50%
K_2O	0.40%

The total oxide content of the solution is 57.9 g/l.

b. Precisely the same solution was prepared, with the omission of the nucleating agents TiO_2 and ZrO_2.

Preparation of Coatings

Thin, transparent coatings were obtained by drawing out of dilute solutions (10 g total oxide per liter in the case of Solution (a), and 40 g total oxide per liter in the case of Solution (b), into the ambient (moist) air, followed by heating at 630°C. for 15 minutes.

EXAMPLE 7 — Silicate Glass with High Alkali Content

Preparation of the Solution

The following were placed successively in a three-necked flask provided with stirrer and reflux condenser, with stirring and flooding with nitrogen:

300.0 g	ethanol (dry)
28.9 g	$Al(OC_4H_9)_3$
2.0 g	acetyl acetone

The mixture was then refluxed until it was clear, and then the following were added:

121.5 g $Si(OCH_3)_4$ in 120 ml ethanol

31.5 ml $NaOCH_3$ solution (solution in CH_3OH, corresponding to 172 g Na_2O per liter).

The solution is reddish brown and stable; it contains the oxides in the following concentration:

SiO_2	80%
Na_2O	10%
Al_2O_3	10%

The total oxide content of the solution was 80 g/l.

Coatings were applied to glass supports which were drawn from a solution of 10 g total oxide per liter, at a rate of 5 cm/min into the ambient air, and these became glassy clear after heating at 500°C. for about 15 minutes.

EXAMPLE 8 — Magnesium Aluminum Spinel

Preparation of the Solution

The following are successively placed in a two-necked flask provided with a stirrer:

250 ml of i-propanol

147 g of Al (O sec. $C_4H_9)_3$

30 ml of acetyl acetone

The mixture is stirred until the Al(O sec. $C_4H_9)_3$ has clearly gone into solution. Then the following is added:

300 ml of ethanol.(99.9percent pure)

345 Ml $Mg(OCH_3)_2$ solution (sol. in methanol, corresponding to 35.2 g of MgO/l)

The clear solution obtained has a pale yellow color. It contains the oxides in the following molar ratio: 1 MgO . 1 Al_2O_3, at a total oxide content of 38 g/l.

Preparation of Thin Coatings

The solution is diluted to 30 g total oxide per liter with ethanol. A cover glass slip is immersed and withdrawn at a uniform rate of 5 cm/min into the ambient (moist) air. Then the coating is baked at 500°C. for 30 minutes.

Properties of the Coating

The coating is transparent and steel scriber-proof.

It is impossible by known methods to make spinels from $Mg(NO_3)_2$. $6H_2O$ and $NH_4Al(SO_4)_2$. 12 H_2O at temperatures below 850°C.

Example for Comparison

45.3 g NH $Al(SO_4)_2$. 12 H_2O

25.6 g $Mg(NO_3)_2$.6 H_2O

were melted in a procelain dish in their own water of crystallization and stirred to form a homogeneous liquid. During the heating, first the water of crystallization escapes, and later nitrous gases and SO_3 are yielded. After 2 hours of heat treatment at 620°C., no spinel can be detected by X-rays in the white powder. Not until after heating at 850°C for 24 hrs. do the mixed oxides turn partially into spinel.

What is claimed is:

1. Process for the production of a glassy, or crystalline multi-component oxide coating on a substrate which comprises: p1 a. dissolving in an organic solvent as a first component at least one of alkali metal compounds and alkali earth metal compounds and as a second component at least one of metal compounds of Groups IB, IIB, III, IV, V, VI, VII A or VIII of the periodic system, maintaining the solution at a temperature and for a time for reaction of said first component with said second component, and formation of a solution containing the reaction product, the proportion of the metal compounds in said organic solution corresponding to the composition of said multi-component oxide coating,

b. coating the substrate with said solution, evaporating solvent from the solvent coating in the presence of moisture, to obtain said reaction product in solid, hydrolyzed form, and

c. heating said reaction product in solid, hydrolyzed form to a temperature below the melting point or melting range of said multi-component oxide to form said multi-component oxide coating.

2. Process according to claim **1,** wherein said oxide coating is a glass, the ratio of the reactive metal compounds being so selected that the ratio of the resulting oxides is in the glass-forming range of the oxidic multi-component oxide coating.

3. Process according to claim **1,** wherein said ratio of the reactive metal compounds corresponding to a glass-ceramic and the solvent coating containing nucleating agent so that a glass coating forms which by an appropriate temperature program can be partially crystallized to form the glass ceramic.