

- [54] METHOD OF PREPARING $P_2O_5=SiO_2$ PRODUCTS
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[56] **References Cited**
UNITED STATES PATENTS

| | | | |
|-----------|---------|-----------------------|-------------|
| 2,738,336 | 3/1956 | Mavity | 260/448.8 A |
| 2,799,693 | 7/1957 | Dodgson | 260/448.8 A |
| 2,571,039 | 10/1951 | Hyde | 260/37 SB |
| 3,597,252 | 8/1971 | Schroder et al. | 106/52 |
| 3,432,312 | 3/1969 | Feagin et al. | 106/69 |
| 2,389,806 | 11/1945 | McGreagor et al. | 260/448.8 A |
| 2,550,923 | 5/1951 | Hackford et al. | 260/448.8 A |
| 3,640,093 | 2/1972 | Levene et al. | 65/134 |
| 3,414,463 | 12/1968 | Jasinski | 260/46.5 |
| 3,554,698 | 1/1971 | Burzynski et al. | 23/182 |
| 3,652,425 | 3/1972 | Wilson | 106/52 UX |
| 2,945,768 | 7/1960 | Grim | 106/52 |

FOREIGN PATENTS OR APPLICATIONS

| | | |
|-----------|--------|---------|
| 1,941,191 | 1/1971 | Germany |
| 1,286,038 | 1/1969 | Germany |

OTHER PUBLICATIONS

- Schroeder, H. "Oxide Layers Deposited From Organic Solutions" Physics of Thin Films Vol. 5 Academic Press (1969) pg. 87, 94-99.
- Roy, R.; Aids in Hydrothermal Experimentation No. 1, in Journ. Amer. Cer. Soc., 39 [4] p. 145-146

(1956) [TP785A62].
 Tien, T. Y.; et al., The System $BiO_2-P_2O_5$ in Journ. Amer. Cer. Soc., 45 [4] 1962 pp. 422-424 [TP785A62].
 Dislich -Glastechnischen Berichte, 44 Jahrgang, Jan. 1971 Heft 1, pp. 1-8 "Preparation of Multicomponent Glasses Without Fluid Melts"
 Gefter, "Organophosphorus Monomers & Polymers," (1962), pp. 240-241.

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[57] **ABSTRACT**

A method is provided for producing high purity oxide products of phosphorus and silicon such as, for example, a P_2O_5 and SiO_2 glass wherein a silicon alkoxide is directly reacted with phosphorous acid, phosphoric acid, phosphorus pentoxide, or mixtures thereof, in the absence of any addition of a separate hydrolysis catalyst to produce a single phase solution reaction product and this reaction product with water is converted to a two-phase system, which two-phase system is removed of its free liquid components and the residue is then thermally decomposed to produce a product of phosphorus and silicon. This oxide product may be converted to a substantially unitary shape by conventional melting techniques or by conventional sintering techniques. The product may be used as an additive in conventional glass melting operations to supply at least a portion, and preferably all, of the P_2O_5 and/or silica requirements of the batch or the product may be compacted and suitably fired into a substantially unitary body, which body is an excellent target in sputtering applications for forming films on semiconductive materials such as, for example, silicon chips.

9 Claims, No Drawings