Study of the behaviour of YSZ dispersions in water

Della Negra, Michela; Knöfel, Christina; Thydén, Karl Tor Sune; Wandel, Marie

Publication date: 2011

Document Version
Publisher's PDF, also known as Version of record

Citation (APA):
**Motivations:**

Better understanding of the behaviour of yttria fully stabilized zirconia in water for applications in wet ceramic processing.

**Questions:**

Are Y\(^{3+}\) and Zr\(^{4+}\) leaching in solution from the cubic structure?  
Is the particle surface affected?  
Are the particle structure and composition affected?

**Long term treatments in water at different pH**

```
Treatments in native pH
Experimental details
YSZ stable load: 40% in mass, pH adjusted with HCl or NaOH, 3 weeks treatment.

In the acidic range the molar ratio Y/Zr decreases with acidity.
YSZ immersed in the solutions solid load: 40% in mass.
Zr\(^{4+}\) leaches in solution only at low pH.
```

**Titrations performed with:**

HCl 0.2 M and NaOH 0.2 M

**Conclusions:**

- Y\(^{3+}\) is leaching from the cubic structure in aqueous acidic solutions.
- Zr\(^{4+}\) is leaching at pH<1, in smaller extent than Y\(^{3+}\).
- The amount of Zr\(^{4+}\) in solution is low in the entire pH range explored.
- Zeta potential and pH of the dispersion change with time, showing that the particle surface and the solutions are modified.
- The equilibrium is reached in 1-2 days, depending on the pH. Possible issues in suspension stability during processing.
- The YSZ particle structure and overall composition are not affected.