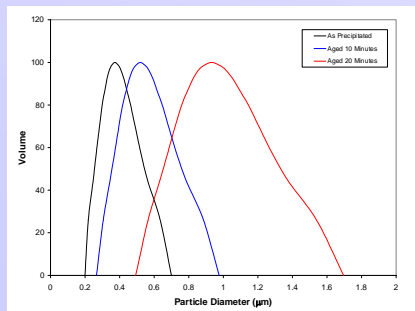


Precipitation and Processing of Sub-Micron Barium Titanyl Oxalate Tetrahydrate

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Barium titanyl oxalate tetrahydrate (BTO) is an important precursor material for the production of barium titanate. It can be produced at low temperatures from readily available materials. It has been shown that BTO of sub-micron particle size can be produced using a double injection mixing technique. Using a modified Clabaugh technique, stable suspensions of 10-200nm BTO have been produced and processing conditions affecting particle size have been investigated.

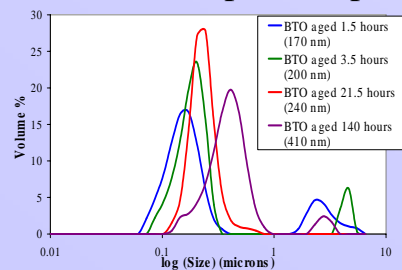
Dispersant Effect



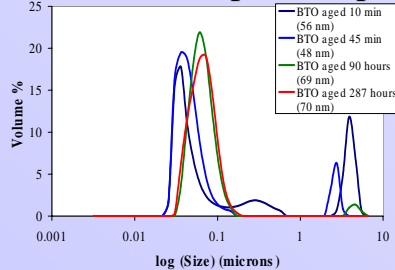
•BTO coarsens in aqueous suspension (Ostwald ripening)

•Add a charged polyelectrolyte (PEI) to block dissolution/re-precipitation

3w/w PEI, suspension pH 1



7w/w PEI, suspension pH 1

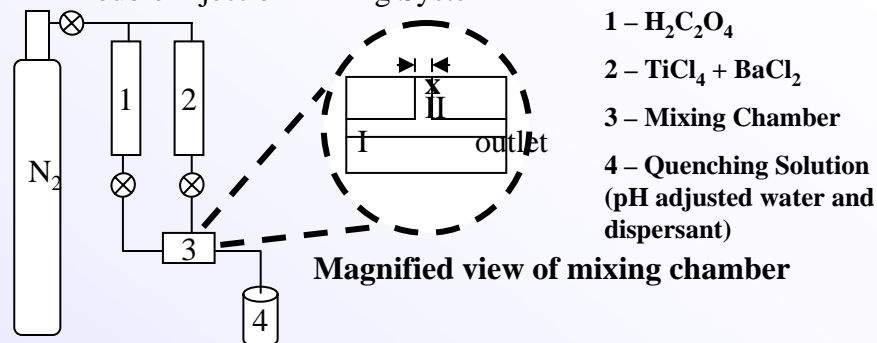


Materials and Methods

•BTO was produced using a modified Clabaugh process



•Double Injection Mixing System



•Advantages

- Sub-micron particle sizes can be achieved
- Phase-pure BaTiO_3 is produced
- Batch or continuous production is possible

•Disadvantages

- Agglomeration and coarsening in suspension w/o additives
- Calcination can lead to hard aggregates
- Several washing steps required

Conclusions

•The double injection mixing technique can be used to produce sub-micron BTO particles

•Stable suspensions of sub-micron BTO can be produced using polyethyleneimine

•The proper concentration of PEI can inhibit BTO particle coarsening

Future Work

•Evaluate alternative methods of dispersant delivery to BTO suspension

•Conduct milling studies to further reduce agglomerates

•Characterize dielectric properties and microstructure of sintered BaTiO_3 material produced from a double-injection precipitated precursor