The Role of Gold Nanometallics on Dielectric, Microstructure and Domain Switching Characteristics of Barium Titanate Ceramics

Supon Ananta[1,*], Jeeranan Nonkumwong[2] and Laongnuan Srisombat[3]

[1]*Department of Physics and Materials Science, Faculty of Science, Chiang Mai University, Chiang Mai 50200, Thailand*
[2]*Department of Chemistry, Faculty of Science, Chiang Mai University, Chiang Mai 50200, Thailand*
[3]*Department of Chemistry, Faculty of Science, Chiang Mai University, Chiang Mai 50200, Thailand*

[*]*corresponding author, E-mail: suponananta@yahoo.com*

Abstract

The production of fine-grained perovskite ferroelectric barium titanate ($BaTiO_3$ or BT) ceramics with dielectric constant enhancement and dielectric loss suppression at Curie temperature is highly desirable for further development in multilayer ceramic chip capacitors (MLCs) and other dielectric applications. So far, the performance of these devices was progressing by shrinking the dimensions of the individual components and packing more components in the same area. Since these electronic devices commonly contain some metallic conductors (*i.e.* MLCs internal electrodes) such as Au, Ag or Ni. Hence, the influence of any possible metallice debris or nanoparticles on the properties of the dielectrics, thereby affecting the reliability of the high volumetric MLCs and then the whole devices, might be one of the issues to be taken into consideration upon their further miniaturization. Here, nanoparticles of gold reinforced BT ceramics were fabricated by using simple solid-state/pressureless sintering methods without any binders. By using a combination of several characterization techniques, the results indicate that using different sintering temperature or gold nanoparticle amounts to produce the ceramics greatly affect the dielectric, microstructure and domain switching behavior of the materials.

Keywords: Barium titanate; Perovskite Ceramics; Dielectrics; Domains.