Nucleophilic stabilization of water-based reactive ink for titania-based thin film inkjet printing

Drop on demand deposition (DoD) of titanium oxide thin films (<500 nm) is performed via a novel titanium-alkoxide-based solution that is tailored as a reactive ink for inkjet printing. The ink is developed as water-based solution by a combined use of titanium isopropoxide and n-methyldiethanolamine (MDEA) used as nucleophilic ligand. The function of the ligand is to control the fast hydrolysis/condensation reactions in water for the metal alkoxide before deposition, leading to formation of the TiO$_2$ only after the jet process. The evolution of the titanium-ligand interactions at increasing amount of MDEA is here elucidated in terms of long term stability. The ink printability parameter (Z) is optimized, resulting in a reactive solution with printability, Z, $>1$, and chemical stability up to 600 h. Thin titanium oxide films (<500 nm) are proved on different substrates. Pure anatase phase is obtained after annealing at low temperature (ca. 400 °C).

General information
State: Published
Organisations: Department of Energy Conversion and Storage, Ceramic Engineering & Science
Contributors: Gadea, C., Marani, D., Esposito, V.
Number of pages: 8
Pages: 10-17
Publication date: 2017
Peer-reviewed: Yes

Publication information
Journal: Journal of Physics and Chemistry of Solids
Volume: 101
ISSN (Print): 0022-3697
Ratings:
BFI (2018): BFI-level 1
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 1
Scopus rating (2017): CiteScore 2.14 SJR 0.594 SNIP 0.821
Web of Science (2017): Impact factor 2.207
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 1
Scopus rating (2016): CiteScore 1.94 SJR 0.596 SNIP 0.928
Web of Science (2016): Impact factor 2.059
BFI (2015): BFI-level 1
Scopus rating (2015): CiteScore 2.01 SJR 0.603 SNIP 0.974
Web of Science (2015): Impact factor 2.048
BFI (2014): BFI-level 1
Scopus rating (2014): CiteScore 1.83 SJR 0.654 SNIP 1.02
Web of Science (2014): Impact factor 1.853
BFI (2013): BFI-level 1
Scopus rating (2013): CiteScore 1.86 SJR 0.668 SNIP 1.103
Web of Science (2013): Impact factor 1.594
ISI indexed (2013): ISI indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): CiteScore 1.74 SJR 0.726 SNIP 1.083
Web of Science (2012): Impact factor 1.527
ISI indexed (2012): ISI indexed yes
BFI (2011): BFI-level 1
Scopus rating (2011): CiteScore 1.59 SJR 0.67 SNIP 0.99
Web of Science (2011): Impact factor 1.632
ISI indexed (2011): ISI indexed yes
BFI (2010): BFI-level 1
Scopus rating (2010): SJR 0.726 SNIP 0.883
Web of Science (2010): Impact factor 1.384
BFI (2009): BFI-level 1