Overview of doctoral theses on Atomic Layer Deposition collected in the Virtual Project on the History of ALD

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Intro: Virtual Project on the History of ALD

The Virtual Project on the History of ALD (VPHA) is a worldwide collaborative Open Science initiative started in summer 2013, set up to clarify the early days of Atomic Layer Deposition (ALD), especially related to its two independent discoveries. In this VPHA, early ALD publications are overviewed up to 1986 in an atmosphere of Openness, Respect and Trust. Also, four scientific journal articles have resulted [1-4]. The VPHA is still open for more volunteers; for the invitation to participate, please see the supplementary information in Ref. 3, or browse through the VPHA website [5].

ALD thesis list

In the VPHA, we are compiling a worldwide list of doctoral theses (and "professor's theses") and analyse trends in it. Anyone is allowed to browse the list and propose entries to it; please find links via the VPHA website [5]. At the time of creating this poster, VPHA's thesis collection contains 534 entries. The PhD-equivalent theses in the collection, up to year 2018, are listed in Table 1. Here, included is: year published, name of author, title in English (translated in the VPHA, if needed), and original language of the thesis. The VPHA website [5] contains additional material such as the thesis title in the original language and name of the university. The number of PhD-equivalent theses per country is shown in Figure 1, and a map of theses per city in Figure 2.

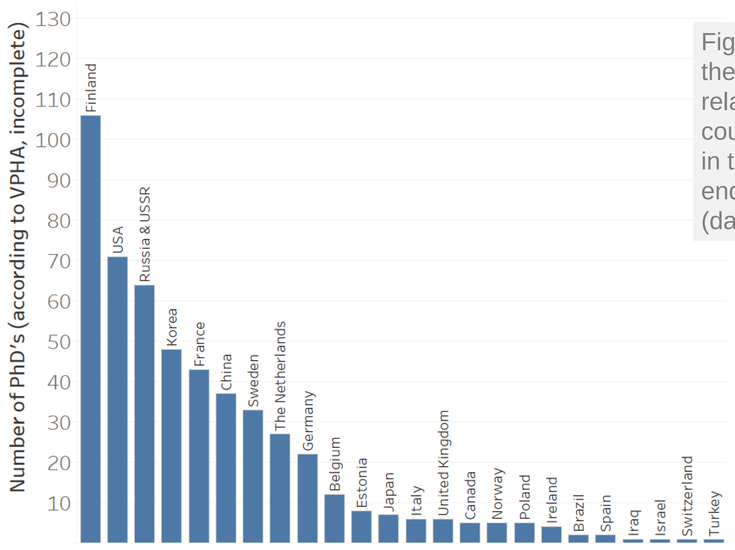

Figure 1. Doctoral theses on ALD-related topics per country, collected in the VPHA, up to end of year 2018 (date: 16.7.2019).

ALD thesis world map, according to VPHA (July 2019, incomplete)

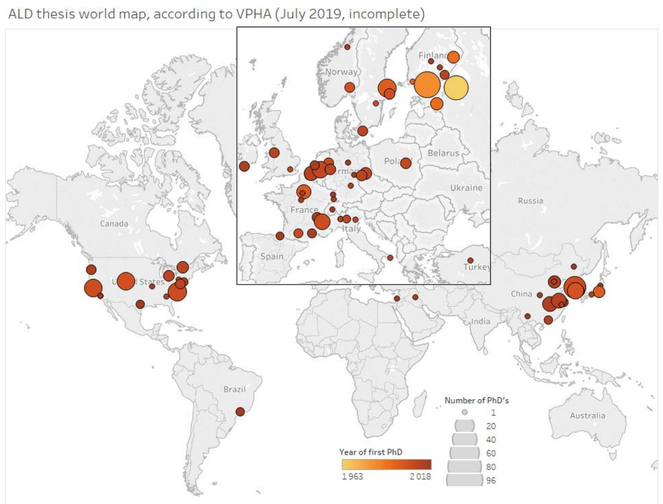

Figure 2. A world distribution plot of doctoral theses on ALD-related topics collected in the VPHA, up to end of year 2018 (date: 16.7.2019). The size of the circles represents the number of records, while the colour represents the first thesis originating from that location.

Table 1. List of PhD-equivalent theses on ALD

Year;Author name;Thesis name in English;Language of the thesis

1963;S. I. Koltsov;The study of interaction of carbon tetrachloride with silica gel;Russian
1965;G.N. Kuznetsova;Study of a reaction products between hydrated silica and metal ions by IR spectroscopy;Russian
1969;A. N. Volkova;Interaction of some chlorides with silica gel - reaction of molecular layering;Russian
1971;G.V. Sveshnikova;Synthesis and study of thin oxide layers on the silicon surface;Russian
1972;R. R. Rakhimovski;Synthesis and study of thin oxide layers on the surface of single-crystal silicon;Russian
1973;A. A. Malygin;Interaction of oxychlorides of vanadium, chromium and phosphorous with silica gel - reaction of molecular layering;Russian
1973;V. M. Smirnov;Synthesis and activity study of a thin oxide layers on the silica gel surface;Russian
1974;E. P. Smirnov;Synthesis of carbon and titanium oxide layers on carbon surface by the molecular layering method;Russian
1974;T. V. Tuz;Synthesis and stability of thin oxide layers on the silica gel surface;Russian
1977;M. A. Eremeeva;Synthesis and research by IR - ATR spectroscopy methods and ellipsometry of ultrathin oxide films on the surface of single crystal silicon and germanium;Russian
1977;V. B. Kopylov;Synthesis of carbon layers on the silica gel surface by molecular layering and study of their properties;Russian
1977;V. I. Kovalkov;Synthesis of fine powder with desired structural and chemical properties of their surface using molecular layer deposition and the study of their properties;Russian
1977;A. A. Malkov;Synthesis by molecular layering method of metal oxide layers on the surface of the carbon fibers and study of their properties;Russian
1978;V. E. Drozd;Synthesis and study of oxide coatings obtained by molecular layer deposition technique on the surface of semiconductors;Russian
1978;A. M. Postnova;Study of the structure and reactivity of vanadium containing silica gel obtained by molecular layer deposition;Russian
1978;N. A. Stepanova;Synthesis of iron and zinc-containing layers on the surface of silica gel;Russian
1979;V. K. Gromov;Synthesis by the molecular layering method of titanium oxide layers on the surface of quartz, silicon, copper and ellipsometric study of substrate/ synthesized layer boundary;Russian
1979;V. N. Postnov;Synthesis of inorganic matrices using the molecular layering method and the study of their reactivity in the process of adsorption of amino acids;Russian
1980;S. K. Gordeev;Synthesis of carbon, titanium, and chromium oxides on the diamond surface and study of their physicochemical properties;Russian
1980;V. D. Ivin;Synthesis of carbon and of phosphorus-carbon coatings on the carbon fiber surface and the study of their physico-chemical properties;Russian
1980;B. D. Sokolov;Effect of physical and chemical properties of carbon fiber surface on the reinforcement of composite materials;Russian
1980;V. P. Tolstoy;Synthesis and physicochemical study of ultrathin oxide layers on metal surfaces;Russian
1980;M. N. Tsvetkova;Molecular layering of active structures on the surface of the glass microspheres and study of their physical and chemical properties;Russian
1981;A. V. Krasnobryzhii;Reaction of titanium (IV) and iron (III) chlorides, vanadium (V) and chromium (VI) oxychlorides with various graphite materials;Russian
1982;V. F. Dergachev;Development of technology for gas phase silica gel modification by vanadium;Russian
1982;N. N. Kopylov;Structure and properties of ultrathin titanium oxide layers synthesized on the monocrystalline silicon surface in an electric field;Russian
1983;A. V. Brykalov;Synthesis of silica gel based hemosorbents by molecular layering method and their physico-chemical properties;Russian
1983;A. L. Egorov;Synthesis of thin oxide films on the surface of tantalum and gallium arsenide, their structure and properties;Russian
1983;Veli-Pekka Tanninen;X-ray diffraction studies of aluminium powder and electroluminescent zinc sulphide thin films;English
1983;Runar Törnqvist;Electroluminescence in ZnS:Mn thin film structures grown by atomic layer epitaxy;English
1984;Yu. M. Artemyev;Physico-chemical properties of iron polysilicates synthesized by chemical assembly;Russian
1984;S. E. Kuranaliv;The reaction of ammonia with a copper-titanium and copper-vanadium films synthesized on the surface of copper;Russian
1985;A. V. Evdokimov;Synthesis of multicomponent metal oxide monolayers on the silica gel surface and characteristics of their structure and inter-functional interactions;Russian
1985;A. A. Selmagzimov;Chemical modification and the surface properties of the anode aluminum and titanium oxides;Russian
1985;T. A. Vitkovskaia;Surface modification of photoluminophors by the molecular layering technique;Russian
1986;T. B. L'vova;Chemical modification of coal from the gaseous phase by vanadium (V), chromium (VI), and phosphorus (III) compounds and study of their absorptive properties;Russian
1986;A. B. Zhidkov;Gas phase kinetics of heterogeneous synthesis of titanium carbide and nitride on the surface of carbon materials;Russian
1987;V. I. Gubaidullin;Synthesis and investigation of multilayer regular structures based on A2B6 compounds;Russian
1987;A. N. Krutilin;Physico-chemical properties of multilayer titanium-vanadium oxide films synthesized by molecular layering method on the surface of silicon;Russian
1987;A. I. Kudryashova;Acid-base properties of silicon, aluminum, zinc, and magnesium oxide surfaces and their changes in the process of structural and chemical transformations;Russian
1987;Jukka Lahtinen;Electro-optical studies of semiconductor compounds for electroluminescent and laser devices;English
1987;V. A. Mitnikov;Synthesis, formation and some properties of zinc chalcogenide films produced by atomic layering;Russian
1987;A.I. Romanychev;Precision synthesis of thin films of zinc and cadmium sulphides and multilayer periodic structures on their basis;Russian
1987;S. A. Trifonov;Synthesis and thermal-oxidative stability of reaction products of phosphorus trichloride and phenolformaldehyde epoxy materials;Russian
1987;A. S. Yakovlev;Properties of interface boundaries between monocrystalline silicon and ultra-thin layers of titanium and silicon oxides synthesized by molecular layering method;Russian
1988;S. V. Murashov;Synthesis and formation of cadmium chalcogenide films by surface chemical assembly;Russian
1988;Markku Oikkonen;X-ray diffraction and ellipsometric studies of zinc sulfide thin films grown by atomic layer epitaxy;English
1988;E. Yu. Popova;Gas phase modification of the dispersed silicon dioxide material by Zn, Fe, Ti containing structures and the use of these synthetic products in polymer composites;Russian
1988;Markku Tammenmaa;The atomic layer epitaxy growth and characterization of zinc sulfide and alkaline earth sulfide thin films for electroluminescent applications;English
1989;E. A. Avrutina;Physico-chemical properties of the optically active titanium oxide structures synthesized by the molecular layering method on the surface of highly dispersed silica and zinc;Russian
1989;V. D. Kupriyanov;Synthesis on the dispersed silicon dioxide surface and modification of the luminescent zinc sulfide type structures;Russian
1990;A. I. Klusevich;The synthesis and properties of thin film structures based on aluminum and tantalum oxides;Russian
1990;P. V. Rogowski;Physico-chemical properties and reactivity of multilayer vanadium, phosphorus and titanium oxide systems obtained by the molecular layering method;Russian
1991;Structural-chemical transformations on the surface of silicon dioxide by molecular layering, titanium- and silicon-nitrogen structures in the temperature range 200-800°C;Structural-chemical transformations on the surface of silicon dioxide by molecular layering, titanium - and silicon-nitrogen structures in the temperature range 200–800°C,Russian
1992;Pipsa Helena Hiva;Theoretical studies on adsorption interactions on inorganic surfaces: Applications to semiconductors and inorganic oxides;English
1992;Marina Lindblad;Cluster models for chemisorption on non-metallic surfaces;English
1992;Hele Siimon;Atomic layer molecular beam epitaxy of A2B6 compounds described on the basis of kinetic equations model;English
1993;Markku Åberg;An electroluminescent display simulation system and its application for developing grey scale driving methods;English
1993;Suvi Haukka;Characterization of surface species generated in atomic layer epitaxy on silica;English
1994;Lars-Peter Lindfors;Hydrogenation of toluene on supported nickel - from catalyst preparation to reaction kinetics;English
1994;Mikko Ritala;Atomic layer epitaxy growth of titanium, zirconium and hafnium dioxide thin films;English
1996;Markku Yliiammi;Preparation and analysis of thin film electroluminescent devices;English
1997;S. D. Dubrovenskii;Synthesis of vanadium titanium oxide nanostructures on the surface of silica gel and pyrographite and simulation of the processes of their formation;Russian
1997;Janne Jokinen;Time-of-flight spectrometry of recoiled atoms in the analysis of thin films;English
1997;Zh. N. Ishutina;Phase formation and properties of materials in the compositions on the basis of the system Al2O3-SiO2-TiO2;Russian
1997;Arla Kytökivi;Growth of ZrO2 and CrOx on high surface area oxide supports by atomic layer epitaxy;English
1998;I.O. Nikiforova;Formation and investigation of charge properties of MOS structures based on alumina;Russian
1998;Yousuke Nishitsuji;Study of high efficiency Cu(InGa)Se2 thin-film solar cells with various buffer layers;English
1998;O. V. Osipenkova;Local physico-chemical transformations on the surface of silica in the processes of interaction with TiCl4, VOCl3, CrO2Cl2 and H2O;Russian
1998;Baosheng Sang;Study of transparent conducting ZnO grown by atomic layer deposition and its applications to amorphous silicon solar cells;English
1998;Per Tägtström;Vapor phase deposition of WO and WC;English
1998;Marja Tiitta;Studies on precursors and their application in the atomic layer epitaxy growth of thin films for electroluminescent devices;English
1999;Arja Hakuli;Preparation and characterization of supported CrOx catalysts for butane dehydrogenation;English
1999;Kaupo Kukli;Atomic layer deposition of artificially structured dielectric materials;English
1999;Maria Kurhinen;Interactions of Mo(CO)6 and Co2(CO)8 with alumina and silica supports: IR spectroscopic, modelling and temperature programmed studies;English
1999;Per Mårtensson;Atomic layer epitaxy of copper;English
1999;Sari Myllyoja;"Chromium hexacarbonyl supported on alumina and silica surfaces by gas phase adsorption; characterisation and activity in hydrodesulphurisation";English
1999;Sari Suvanto;Co2(CO)8 adsorbed on SiO2 and MCM-41: Gas phase preparation and characterisation;English
1999;Mika Suvanto;Hydrotreating catalysts based on tungsten hexacarbonyl: Controlled preparation, characterisation and activity in thiophene hydrodesulphurisation;English
1999;Mikko Utriainen;Exploiting atomic layer epitaxy thin film deposition technique in solid-state chemical sensor applications;English
2000;Koji Dairiki;Study of Amorphous Silicon Solar Cells with High Stabilized-Efficiency;English
2000;Wei-Min Li;Characterization and modification of SrS based blue thin film electroluminescent phosphors;English
2000;Mikael Schuisky;CVD and ALD in the Bi-Ti-O system;English
2000;El Bekkaye Yousfi;Study of Atomic Layer Epitaxy (ALE) of oxides (ZnO, Al2O3) and sulfides (ZnS, In2S3) thin films: In situ quartz crystal microgravimetry and application for Cu(In,Ga)Se2 solar cells;French
2001;Katarina Forsgren;CVD and ALD of Group IV- and V-Oxides for Dielectric Applications.;English
2001;Marika Juppo;Atomic Layer Deposition of Metal and Transition Metal Nitride Thin Films and In Situ Mass Spectrometry Studies;English
2001;Jung-Wook Lim;A study on the kinetic model the thin film growth in ALD;English
2001;Björn Mårtid;Theoretical modelling of thin film growth in the B-N system;English
2001;Minna Nieminen;Deposition of binary and ternary oxide thin films of trivalent metals by atomic layer epitaxy;English
2001;Jarkko Räty;Re2(CO)10 deposited on g-alumina: temperature programmed studies, modelling and activity in thiophene hydrodesulphurization;English
2002;Jung-Hun Chae;A study on the nickel thin films formed by oxidation-reduction ALD;Korean
2002;Jin-Seong Park;A study on the plasma-enhanced atomic layer deposition of Ta-N, Ti-N and Ti-Si-N thin films;English
2002;Matti Putkonen;Development of low-temperature deposition processes by atomic layer epitaxy for binary and ternary oxide thin films;English
2002;Riikka Puurunen;Preparation by atomic layer deposition and characterisation of catalyst supports surfaced with aluminium nitride;English
2002;Timo Sajavaara;Heavy ion recoil spectroscopy of surface layers;English
2002;Antti Rahtu;Atomic layer deposition of high permittivity oxides: film growth and in situ studies;English
2003;Frédérique Donsanti;Comparative study of deposition process of semiconductor thin films from metalorganic precursors : ALCVD reactor and PACVD reactor;French
2003;Woo-Seok Jeon;A study on the Al2O3 thin film deposition by ALD and PEALD;Korean
2003;Jaana Kanervo;Kinetic analysis of temperature-programmed reaction spectrometry;English
2003;Marianna Kemell;Electrodeposition of copper indium selenide and doped zinc oxide thin films for solar cells;English
2003;Yong-Ju Lee;A study on the atomic layer deposition of Ti-Al-N thin films using plasmas;English
2003;Ola Nilsen;Growth of thin films of functional oxides with the ALCVD method;English
2003;Jenny Olander;Studies on Growth of SiC and BN : from Theory and Experiments;English
2003;Hyun-Jung Song;A study on plasma-enhanced atomic layer deposition of Ta-Si-O thin films;English
2003;Jonas Sundqvist;Employing Metal Iodides and Oxygen in ALD and CVD of Functional Metal Oxides .;English
2003;Jeffrey R. Wank;Coating particles with alumina nanolayers utilizing atomic layer deposition in a fluidized bed reactor;English
2004;Satu Ek;Controlled preparation of aminofunctionalized surfaces on porous silica by atomic layer deposition;English
2004;Stina Jönsson;Towards flexible organic electronics : photoelectron spectroscopy of surfaces and interfaces.;English
2004;Oh-Kyum Kwon;A study on the ruthenium thin films formed by atomic layer deposition;English
2004;Se-Hoon Kwon;A study on the plasma-enhanced atomic layer deposition of RuTiN thin films;English
2004;Mohamed Lashdaf;Preparation and characterisation of supported palladium, platinum and ruthenium catalysts for cinnamaldehyde hydrogenation;English
2004;Raija Matero;Atomic Layer Deposition of Oxide Films – Growth, Characterisation and Reaction Mechanism Studies;English
2004;Stefan Persson;Modeling and characterization of novel MOS devices;English
2004;Jan Sterner;ALD Buffer Layer Growth and Interface Formation on Cu(In,Ga)Se2 Solar Cell Absorbers;English
2004;Tobias Törndahl;Atomic Layer Deposition of Copper, Copper(I) Oxide and Copper(I) Nitride on Oxide Substrates;English
2004;Dongping Wu;Novel concepts for advanced CMOS: Materials, process and device architecture;English
2005;Titta Aaltonen;Atomic Layer Deposition of Noble Metal Thin Films;English
2005;Sanna Arakisinen;Chromium oxide catalysts in the dehydrogenation of alkanes;English
2005;Petra Alen;Atomic Layer Deposition of TaN, NbN and MoN films for Cu metallization;English
2005;Jean-Frédéric Guillaumond;Study of resistivity and electromigration behaviour in interconnections intended for the 90 nm - 32 nm node technologies;French
2005;Michael Jason Kelly;Reactions of High-k Gate Dielectrics: Studies in Hafnium, Zirconium, Yttrium, and Lanthanum-based Dielectrics and in-situ Infrared Results for Hafnium Dioxide Atomic Layer Deposition;English
2005;Jin-Hyock Kim;A study on the growth kinetic modeling for atomic layer deposition of multi-component thin film;English
2005;Jaehoo Park;Fabrication and characterizations of self-aligned poly-Si gate transistors using HfO2 thin films;English
2005;Kie Jin Park;The Atomic Layer Deposition of Noble Metals for Microelectronics Applications;English
2005;Junsic Hong;Vapor Phase Deposition of Self-Assembled Monolayers as a Resist Towards Area-Selective Atomic Layer Deposition;English
2006;S. A. Belova;Development of color indicators based on inorganic porous matrices with a modified surface for control of gas environment;Russian
2006;Cyrine Brahim;Elaboration and Electrochemical Performances of Nanostructured Materials for Solid Oxide Fuel Cells;French
2006;Radko Bankras;In-situ RHEED and characterization of ALD Al2O3 gate dielectrics;English
2006;Rong Chen;Surface Modification for Area Selective Atomic Layer Deposition on Silicon and Germanium;English
2006;Leonard Jeloaica;Ab initio investigation of reaction mechanism in the initial phase of deposition by atomic layer deposition of oxides with middle and high permittivity on silicon;French
2006;Andres Johansson;Template-Based fabrication of Nanostructured Materials;English
2006;Oh Seong Kwon;Atomic layer deposition and characterization of SrTiO3 thin films;English
2006;Jaakko Niinistö;Atomic layer deposition of high-k dielectrics from novel cyclopentadienyl-type precursors;English
2006;Antti Niskanen;Radical enhanced atomic layer deposition of metals and oxides;English
2006;Jani Päivasaari;Atomic layer deposition of lanthanide oxide thin films;English
2006;Charlotte Platzer-Björkman;Band Alignment Between ZnO-Based and Cu(In,Ga)Se2 Thin Films for High Efficiency Solar Cells;English
2006;Zachary Aspen Sechrist;One-dimensional and three-dimensional photonic crystals created using atomic layer deposition;English
2006;David B. Terry;A Holistic Investigation of Alternative Gate Stack Materials for Future CMOS Applications;English
2007;Jaan Aarik;Atomic Layer Deposition of titanium, zirconium and hafnium dioxides: growth mechanisms and properties of thin films.;English
2007;Nicole Marie Adamczyk;Molecular layer deposition of poly(p-phenylene terephthalamide) films using terephthaloyl chloride and phenylenediamine;English
2007;Igor Arvidsson;Theoretical Investigations of Boron Related Materials Using DFT;English
2007;Moonju Cho;Study on atomic layer deposited high-k HfO2 film and reliability problem based on chlorine/carbon residue;English
2007;Xiaohua Du;Understanding and optimization of gas sensors based on metal oxide semiconductors;English
2007;Jenni Harjuoja;Atomic layer deposition of binary and ternary lead and bismuth thin films;English
2007;Gary Kevin Hyde;Functional Textiles via Self-assembled Nanolayers and Atomic Layer Deposition;English
2007;Indrek Jõgi;Conduction mechanisms in thin atomic layer deposited films containing TiO2;English
2007;Ja-Yong Kim;A study on the step coverage modeling of thin films in atomic layer deposition;English
2007;Seong Keun Kim;Deposition behavior and dielectric properties of the Ti-based oxide films for memory devices;English
2007;A. I. Kutchiev;Synthesis and quantum-chemical study of vanadium oxide structures on the silica surface and their interactions with pairs of VOCl3 and H2O;Russian
2007;Jung-Dae Kwon;A study on the two-step atomic layer deposition for TaN thin films;English
2007;Jarod Alan McCormick;Atomic layer deposition on nanoparticles in a rotary reactor;English
2007;Pan-Kwi Park;The microstructure and electrical property of HfO2/Al2O3 films deposited by atomic layer deposition;English
2007;Kimmo Solehmainen;Fabrication of microphotonic waveguide components on silicon;English
2007;Marko Vehkamäki;Atomic layer deposition of multicomponent oxide materials;English
2007;Christopher Alvin Wilson;Aluminum oxide and tungsten atomic layer deposition on polymers and nanoparticles;English
2007;Taija Zeeling (née Kainulainen);Rhodium and cobalt catalysts in the heterogeneous hydroformylation of ethene, propene and 1-hexene;English
2008;Abuduwayiti Aierken;Passivation of GaAs surfaces and fabrication of self-assembled In(Ga)As/GaAs quantum ring structures;English
2008;Messaoud Benamira;Nanostructured Mixed Conductor for Solid Oxide Fuel Cells (SOFC): Elaboration and Electrochemical Performances of new architectures;French
2008;Beau Bernard Burton;New surface chemistries for the atomic layer deposition of oxides and nitrides;English
2008;Hoi-Sung Chung;A study on the ALD modeling for process design of multi-component thin films;English
2008;Kai-Erik Elers;Copper diffusion barrier deposition on integrated circuit devices by atomic layer deposition technique;English
2008;Stephan Heil;Plasma-Assisted Atomic Layer Deposition of Metal Oxides and Nitrides;English
2008;Kai Kolari;Fabrication of silicon and glass devices for microfluidic bioanalytical applications;English
2008;Satu Korhonen;Effect of Support Material on the Performance of Chromia Dehydrogenation Catalysts;English
2008;Erik Langereis;Plasma-assisted atomic layer deposition: an in situ diagnostic study;English
2008;Ville Miikkulainen;Molybdenum nitride thin films on micro- and nanopatterned substrates: atomic layer deposition and applications;English
2008;Sang Jeong Oh;Spectroscopic Investigation of Hf-Si Oxynitride Alloys and Low Temperature Cobalt Metal ALD;English
2008;Tae Joo Park;New materials in advanced gate stacks for next generation complementary metal oxide semiconductor field effect transistors(CMOSFETs) technology;English
2008;Tero Pilvi;Atomic Layer Deposition for optical applications: metal fluoride thin films and novel devices;English
2008;Mårten Rooth;Metal Oxide Thin Films and Nanostructures Made by ALD;English
2008;Jouni Tiilikainen;Novel genetic fitting algorithms and statistical error analysis methods for X-ray reflectivity analysis;English
2008;Perrine Violet;Thermodynamic and experimental studies of ALD (Atomic Layer Deposition) of TaN and of its organometallic precursor PDMAT, Ta[N(CH3)2]5, used in microelectronics;French
2008;Ioana Volintiru;Remote Plasma Deposition of Metal Oxides: Routes for Controlling the Film Growth;English
2008;Aleksandra Wójcik;Structural and magnetic properties of low-temperature ZnO and ZnMnO layers;Polish
2009;Ji-Hoon Ahn;A study on SrTiO3 thin films deposited by plasma-enhanced atomic layer deposition for DRAM capacitor dielectric;English
2009;Leif Backman;Supported Cobalt Catalysts – Preparation, Characterisation and Reaction Studies;English
2009; Rym Benaboud;Thermodynamical study and elaboration of conductive films (Ti-N-C, W-N-C) by PEALD (Plasma Enhanced Atomic Layer Deposition) for Metal/Isolant/Metal capacitors.;French
2009;A. K. Bulkina;Structural and chemical transformations on the surface of films of polyethylene and polyvinyl chloride by reaction with halides of phosphorus, vanadium, titanium and chromium;Russian
2009;G. Carraro;Is Rust a Real Must? From Design to Applications of Multifunctional Fe2O3-based Nanomaterials;English
2009;Byung Joon Choi;Deposition behavior and phase change characteristics of Ge2Sb2Te5 thin films for phase change memory application;English
2009;Zachary Michael Conway Gibbs;Growth and characterization of polymer thin films grown using molecular layer deposition with heterobifunctional precursors;English
2009;David Nathan Goldstein;Surface chemistry of the atomic layer deposition of metals and group III oxides;English
2009;Dae-Kwon Joo;A study on TiAlO films deposited by plasma enhanced atomic layer deposition;Korean
2009;Luca Lamagna;Atomic layer deposition and characterization of rare earth oxides for innovation in microelectronics;English
2009;Han-Bo-Ram Lee;Atomic Layer Deposition of Cobalt;English
2009;Sang Woon Lee;Growth and characterization of high-k SrTiO3 thin films grown by atomic layer deposition;English
2009;Seong Joon Lim;A study on thin film transistors with atomic layer deposition ZnO channel layer for transparent thin film transistor;English
2009;Eric Lindah;Thin Film Synthesis of Nickel Containing Compounds;English
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