



FORMS & INSTRUCTIONS for Paper Submission of your Doctoral Dissertation or Master's Thesis

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- Preparing Your Manuscript
- ProQuest Subject Categories
- Open Access versus Traditional Publishing
- Embargoes and Restrictions
- Copyright Guide

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Title of Dissertation/Thesis Ferroelectricity in Magnesium Substituted Zinc Oxide Thin Films

Institution conferring degree Pennsylvania State University Degree awarded (Ph.D., MA) Ph.D.

College, School, or Division Earth and Mineral Sciences Year degree awarded 2021

Department or Program Materials Science and Engineering Year manuscript completed 2021

Advisor/Committee Chair Dr. Jon-Paul Maria

Committee Member Dr. Susan Trolier-McKinstry Committee Member Dr. Clive Randall

Committee Member Dr. Brian Foley Committee Member _____

Committee Member _____ Committee Member _____

Language of manuscript English

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Provide up to 6 keywords or short phrases for citation indices, library cataloging, and database searching.

Zinc Oxide Ferroelectricity ZnMgO

Room Temperature MgO Thin Film

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African studies	0293
American studies	0323
Asian American studies	0343
Asian studies	0342
Baltic studies	0361
Black studies	0325
Canadian studies	0385
Caribbean studies	0432
Classical studies	0434
East European studies	0437
Ethnic studies	0631
European studies	0440
French Canadian culture	0482
Gender studies	0733
LGBTQ studies	0492
Hispanic American studies	0737
Holocaust studies	0507
Islamic studies	0512
Judaic studies	0751
Latin American studies	0550
Middle Eastern studies	0555
Native American studies	0740
Near Eastern studies	0559
North African studies	0560
Pacific Rim studies	0561
Regional studies	0604
Scandinavian studies	0613
Slavic studies	0614
South African studies	0654
South Asian studies	0638
Southeast Asian studies	0222
Sub Saharan Africa studies	0639
Women's studies	0453

BUSINESS

Accounting	0272
Arts management	0424
Banking	0770
Business administration	0310
Entrepreneurship	0429
Finance	0508
Management	0454
Marketing	0338
Sports management	0430

COMMUNICATIONS AND INFORMATION SCIENCES

Communication	0459
Information science	0723
Journalism	0391
Library science	0399
Mass communication	0708
Technical communication	0643
Web studies	0646

FINE AND PERFORMING ARTS

Art criticism	0365
Art history	0377
Cinematography	0435
Dance	0378
Design	0389
Fashion	0200
Film studies	0900
Fine arts	0357
Music	0413
Music history	0208
Music theory	0221
Musical composition	0214
Musical performances	0943
Performing arts	0641
Theater	0465
Theater history	0644

ARCHITECTURE

Architecture	0729
Architectural engineering	0462
Landscape architecture	0390

EDUCATION

Adult education	0516
Art education	0273
Bilingual education	0282
Business education	0688
Community college education	0275
Continuing education	0651
Curriculum development	0727
Early childhood education	0518
Education	0515
Education finance	0277
Education history	0520
Education policy	0458
Educational administration	0514
Educational evaluation	0443
Educational leadership	0449
Educational philosophy	0998
Educational psychology	0525
Educational sociology	0340
Educational technology	0710
Educational tests & measurements	0288
Elementary education	0524
English as a second language	0441
Foreign language education	0444
Gifted education	0445
Health education	0680
Higher education	0745
Higher education administration	0446
Home economics education	0278
Industrial arts education	0521
Instructional design	0447
Language arts	0279
Mathematics education	0280
Middle school education	0450
Multicultural education	0455
Music education	0522
Pedagogy	0456
Performing arts education	0457
Physical education	0523
Reading instruction	0535
Religious education	0527
School counseling	0519
Science education	0714
Secondary education	0533
Social sciences education	0534
Special education	0529
Teacher education	0530
Vocational education	0747

HISTORY

African history	0331
American history	0337
Ancient history	0579
Asian history	0332
Black history	0328
Canadian history	0334
European history	0335
History	0578
History of Oceania	0504
Latin American history	0336
Medieval history	0581
Middle Eastern history	0333
Military history	0722
Modern history	0582
Russian history	0724
Science history	0585
World history	0506

LANGUAGE AND LITERATURE

African literature	0316
American literature	0591
Ancient languages	0289
Asian literature	0305
Australian literature	0356
Canadian literature	0352
Caribbean literature	0360
Classical literature	0294
Comparative literature	0295
Creative writing	0203
English literature	0593
French literature	0205
French Canadian literature	0355
German literature	0311
Icelandic & Scandinavian literature	0362
Italian literature	0220
Language	0679
Latin American literature	0312
Linguistics	0290
Literature	0401
Medieval literature	0297
Middle Eastern literature	0315
Modern language	0291
Modern literature	0298
Rhetoric	0681
Romance literature	0313
Slavic literature	0314
Translation studies	0213

PHILOSOPHY AND RELIGION

Aesthetics	0650
Biblical studies	0321
Canon law	0375
Clergy	0319
Comparative religion	0618
Divinity	0376
Epistemology	0393
Ethics	0394
Logic	0395
Metaphysics	0396
Pastoral counseling	0397
Philosophy	0422
Philosophy of religion	0322
Philosophy of science	0402
Religion	0318
Religious history	0320
Spirituality	0647
Theology	0469

LAW AND LEGAL STUDIES

Alternative dispute resolution	0649
Intellectual property	0513
International law	0616
Law	0398
Law enforcement	0206
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Archaeology	0324
Area planning and development	0341
Commerce-Business	0505
Criminology	0627
Cultural anthropology	0326
Demography	0938
Economic history	0509
Economic theory	0511
Economics	0501
Folklore	0358
Forensic anthropology	0339
Geography	0366
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International relations	0601
Labor economics	0510
Labor relations	0629
Military studies	0750
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Organizational behavior	0703
Peace studies	0563
Physical anthropology	0327
Political Science	0615
Public administration	0617
Public policy	0630
Recreation	0814
Social research	0344
Social structure	0700
Social work	0452
Sociolinguistics	0636
Sociology	0626
Transportation	0709
Urban planning	0999

INTERDISCIPLINARY

Alternative energy	0363
Biographies	0304
Climate change	0404
Cultural resources management	0436
Disability studies	0201
Energy	0791
Food science	0359
Home economics	0386
Information technology	0489
Multimedia communications	0558
Museum studies	0730
Sexuality	0211
Sustainability	0640
Textile research	0994
Wood sciences	0746

Behavioral, Natural, and Physical Sciences

AGRICULTURE

Agriculture	0473
Agriculture economics	0503
Agriculture education	0517
Agriculture engineering	0539
Agronomy	0285
Animal diseases	0476
Animal sciences	0475
Aquatic sciences	0792
Forestry	0478
Horticulture	0471
Plant pathology	0480
Plant sciences	0479
Range management	0777
Soil sciences	0481
Urban forestry	0281
Wildlife management	0286

BEHAVIORAL SCIENCES

Behavioral psychology	0384
Behavioral sciences	0602
Clinical psychology	0622
Cognitive psychology	0633
Counseling psychology	0603
Developmental psychology	0620
Experimental psychology	0623
Music therapy	0209
Occupational psychology	0624
Personality psychology	0625
Physiological psychology	0989
Psychobiology	0349
Psychology	0621
Quantitative psychology	0632
Social psychology	0451

BIOLOGICAL SCIENCES

Biochemistry	0487
Bioinformatics	0715
Biology	0306
Biomechanics	0648
Biophysics	0786
Biostatistics	0308
Botany	0309
Cellular biology	0379
Developmental biology	0758
Endocrinology	0409
Entomology	0353
Evolution & development	0412
Genetics	0369
Histology	0414
Limnology	0793
Microbiology	0410
Molecular biology	0307
Morphology	0287
Neurosciences	0317
Parasitology	0718
Physiology	0719
Systematic biology	0423
Veterinary sciences	0778
Virology	0720
Zoology	0472

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Ecology	0329
Macroecology	0420
Paleoecology	0426

ENGINEERING

Aerospace engineering	0538
Artificial intelligence	0800
Automotive engineering	0540
Biomedical engineering	0541
Bioengineering	0202
Chemical engineering	0542
Civil engineering	0543
Computer engineering	0464
Computer science	0984
Electrical engineering	0544
Engineering	0537
Geological engineering	0466
Geophysical engineering	0467
Geotechnology	0428
Hydraulic engineering	0218
Industrial engineering	0546
Mechanical engineering	0548
Mining	0551
Naval engineering	0468
Nanotechnology	0652
Nuclear engineering	0552
Ocean engineering	0547
Operations research	0796
Packaging	0549
Petroleum engineering	0765
Plastics	0795
Robotics	0771
System science	0790

ENVIRONMENTAL SCIENCES

Conservation biology	0408
Environmental economics	0438
Environmental education	0442
Environmental engineering	0775
Environmental geology	0407
Environmental health	0470
Environmental justice	0619
Environmental law	0439
Environmental management	0474
Environmental philosophy	0392
Environmental science	0768
Environmental studies	0477
Land use planning	0536
Natural resource management	0528
Water resources management	0595
Wildlife conservation	0284

GEOSCIENCES

Aeronomy	0367
Atmospheric chemistry	0371
Atmospheric sciences	0725
Biogeochemistry	0425
Biological oceanography	0416
Chemical oceanography	0403
Continental dynamics	0406
Geobiology	0483
Geochemistry	0996
Geographic information science and geodesy	0370
Geology	0372
Geomorphology	0484
Geophysics	0373
Hydrologic sciences	0388
Marine geology	0556
Meteorology	0557
Mineralogy	0411
Paleoclimate science	0653
Paleontology	0418
Petroleum geology	0583
Petrology	0584
Physical geography	0368
Physical oceanography	0415
Planetology	0590
Plate tectonics	0592
Remote sensing	0799
Sedimentary geology	0594

HEALTH AND MEDICAL SCIENCES

Aging	0493
Alternative medicine	0496
Audiology	0300
Dentistry	0567
Epidemiology	0766
Gerontology	0351
Health care management	0769
Health sciences	0566
Immunology	0982
Kinesiology	0575
Medical ethics	0497
Medical imaging	0574
Medical personnel	0207
Medicine	0564
Mental health	0347
Nursing	0569
Nutrition	0570
Obstetrics	0380
Occupational safety	0354
Occupational therapy	0498
Oncology	0992
Ophthalmology	0381
Optometry	0210
Osteopathic medicine	0499
Pathology	0571
Pharmaceutical sciences	0572
Pharmacology	0419
Physical therapy	0382
Public health	0573
Public health education	0500
Speech therapy	0460
Surgery	0576
Therapy	0212
Toxicology	0383

**MATHEMATICAL AND
PHYSICAL SCIENCES**

Acoustics	0986
Analytical chemistry	0486
Applied mathematics	0364
Applied physics	0215
Astronomy	0606
Astrophysics	0596
Atomic physics	0748
Chemistry	0485
Computational chemistry	0219
Computational physics	0216
Condensed matter physics	0611
Electromagnetics	0607
Fluid mechanics	0204
High energy physics	0798
High temperature physics	0597
Inorganic chemistry	0488
Low temperature physics	0598
Materials science	0794
Mathematics	0405
Mechanics	0346
Molecular chemistry	0431
Molecular physics	0609
Nanoscience	0565
Nuclear chemistry	0738
Nuclear physics and radiation	0756
Optics	0752
Organic chemistry	0490
Physical chemistry	0494
Physics	0605
Plasma physics	0759
Polymer chemistry	0495
Quantum physics	0599
Statistics	0463
Statistical physics	0217
Thermodynamics	0348
Theoretical mathematics	0642
Theoretical physics	0753