

# Niyaz Ahamad Madhar

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## **Educational Qualification**

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Ph.D. (Materials Science) from Materials Research Centre, Indian Institute of Science, Bangalore, India, during 2004 – 2009

Master of Science (Materials science) from Anna University, Chennai, India during 2001 - 2003

Bachelor of Science (Physics) from The New College, University of Madras, Chennai, India during 1997 – 2000

## **Experience**

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### **1. Assistant Professor at King Saud University, Riyadh, Saudi Arabia from September 2012 to present**

- Research in high temperature super conducting materials
- Teaching courses related to research methodology, basic and advanced physics and materials science

### **2. Postdoctoral Fellow at Ecole polytechnique de Montreal (Affiliated to University of Montreal), Montreal QC, Canada during Jan 2010 – December 2010.**

- Fabrication of polymer-chalcogenide hybrid microstructured optical fibers for infrared applications and studying it's optical properties.
- Preparation of weekly reports and quarterly project reports for the funding agency.
- Studying the methodology and feasibility for new projects based on chalcogenide glasses.

### **3. Visiting Scholar at Lehigh University, PA, USA & Pennsylvania State University, PA, USA during Jan 2006 – August 2006**

- Linear and non-linear optical studies on various tellurite based glasses and glass nanocrystal composites.
- Collaborative work between various groups, travel for experiments and active discussion and publish the completed work.

#### **4. Lecturer in Physics at Veltech Technical University, Chennai, India during August 2003 – December 2003**

- Preparation of course materials and presentations for classes to be conducted.
- Teaching physics at undergraduate level for various classes totaling more than 200 students.
- Setting of question papers, conducting exams and evaluating the answer sheets.
- Best results produced for the year in terms of student satisfaction and success rate in public exams.
- Head of the Youth Red Cross (YRC) for the institution and have arranged events and educational trips for students.

### **Technical skills**

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#### **Materials preparation techniques:**

Fabrication of microstructured optical fibers, solid state synthesis, melt-quenching of glasses and ceramics, thin film deposition by vapour phase epitaxy and sputtering techniques, laser processing of materials, single crystal growth (Czochralski, Bridgman-Stockbarger and solution growth).

#### **Characterization techniques handled and other material processing techniques:**

Scanning Electron Microscopy (SEM), Near-field Scanning optical microscopy (NSOM), optical microscopy, X-Ray Energy Dispersive Spectroscopy (XEDS), Impedance spectroscopy, Micro-Raman spectroscopy, UV-Vis-NIR spectroscopy, Second Harmonic Generation (SHG) setup, Electro-optics, pyroelectric and ferroelectric systems, Powder X-Ray Diffractometer, Thermo Gravimetry-Differential Thermal Analysis (TG-DTA), Differential Scanning Calorimetry (DSC), Universal Testing Machine, Impact test, Toughness test,

Rotational casting, cutting, polishing, lathe machining, drilling, milling, furnace making.

**Computer related:** Networking, HTML 4.0, Java 2.0, C, BASIC, FORTRAN 7.0

### **Projects**

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- 1. Title** : Current limiting mechanism and potentiality of Magnesium diboride (MgB<sub>2</sub>) superconductor for application
- Place** : King Saud University, Riyadh, KSA.
- Period** : January 2014 - present

- 2. Title** : Fabrication of microstructured polymer-chalcogenide fibers for IR applications  
**Place** : Ecole Polytechnique de Montreal, Montreal, QC, Canada.  
**Period** : January 2010 – December 2010
- 3. Title** : Fabrication and characterization of Multifunctional Glass nano/micro crystal composites  
**Place** : Materials Research Centre, Indian Institute of Science, Bangalore, India.  
**Period** : January 2005 - 2008
- 4. Title** : Growth and characterization of Gallium nitride epilayers by vapour phase epitaxy  
**Place** : Crystal Growth Centre, Anna university, Chennai.  
**Period** : December 2002 – June 2003
- 5. Title** : Software for the online management of furniture shop  
**Place** : Icom Technologies, Chennai.  
**Period** : December 2000 – March 2001

## **Ph.D. thesis details**

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**Thesis title:** Functionalities of glass nano-crystal composites comprising tetragonal tungsten bronze type ferroelectric oxides

### **Graphical research summary (at the end of the CV)**

#### **Key points:**

- Successful fabrication of transparent glass–nanocrystal composites (Tellurite and borate glasses comprising nanocrystals of tetragonal tungsten bronze (TTB) type ferroelectric oxides)
- Uniform bulk crystallization in the form of nanocrystals has been achieved for the first time in tellurite glasses.
- Highest glass transition temperature ( $T_g \approx 500^\circ\text{C}$ ) ever reported for any tellurite glass, so far.
- Only strong tellurite glass ever reported based on the kinetic fragility parameter.
- Nano-patterning of crystal lines on tellurite glass surfaces by excimer laser irradiation without using any mask or interference methods.
- Demonstration of spinodal decomposition, line and circular pattern formations along with detailed studies on effect of excimer laser irradiation on tellurite glass surfaces.
- Demonstration of blue second harmonic generation (SHG) in microcrystals of  $\text{Ba}_5\text{Li}_2\text{Ti}_2\text{Nb}_8\text{O}_{30}$  (a TTB type ferroelectric oxide) also exhibiting phase matching near room temperature.
- Glass transition and crystallization kinetic studies of the composites by thermal

analyses.

- Demonstration of pyro and ferroelectricity in these glass-nanocrystal composites.
- Detailed studies on the electrical transport properties for all the glasses and glass nanocomposites which have also shown significant enhancement in dielectric constant while, at the same time, reducing the dielectric loss.
- Spectroscopic, linear and non-linear optical studies on all the glasses.

## MSc thesis details

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**Thesis title:** Growth and characterization of Gallium nitride epilayers by vapour phase epitaxy

- Successful growth of Gallium nitride epitaxial layer on sapphire substrate at various temperatures.
- Demonstration of single crystalline nature or oriented growth by XRD technique.
- Optical studies by UV-Vis spectrophotometer.

## Journal publications

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1. Crystallization, dielectric and optical characteristics of  $\text{TeO}_2\text{-K}_2\text{O-Li}_2\text{O-Nb}_2\text{O}_5$  glasses.  
**M. Niyaz Ahamad** and K.B.R. Varma  
[Phys. Chem. Glasses: Eur. J. Glass Sci. Technol. B](#), 47 (6) (2006) 659–664
2. Nanocrystalline patterning of  $\text{K}_3\text{Li}_2\text{Nb}_5\text{O}_{15}$  on  $\text{TeO}_2$  glasses by excimer laser.  
**M. Niyaz Ahamad**, Shimtaro Mizuno, Takyuki Komatsu and K. B. R. Varma  
[Journal of Crystal Growth](#) 304 (2007) 270–274
3. Multifarious Transparent Glass Nanocrystal Composites  
C. Karthik, **M. Niyaz Ahamad**, B. Harihara venkataraman, N. Syam Prasad, G. Senthil Murugan and K. B. R. Varma,  
[Photonic Glasses and Glass-ceramics](#) (Ed. G. Senthil Murugan), Research Signpost (India) 2008.
4. Evolution and optical properties of nanocrystalline potassium lithium niobate in the glass system  $(100-x) \text{TeO}_2\text{-}x(1.5\text{K}_2\text{O-Li}_2\text{O-}2.5\text{Nb}_2\text{O}_5)$   
**M. Niyaz Ahamad** and K.B.R. Varma  
[Journal of Nanoscience and Nanotechnology](#) 9 (2009) 4910
5. Temperature dependent blue second harmonic generation in  $\text{Ba}_5\text{Li}_2\text{Ti}_2\text{Nb}_8\text{O}_{30}$  microcrystals embedded in  $\text{TeO}_2$  glass-matrix  
**M. Niyaz Ahamad**, A. Vasudevarao, V. Gopalan, H. Jain and K.B.R. Varma  
[Journal of Non-crystalline solids](#) 355 (2009) 1517.
6. Spinodal decomposition in tellurite based glasses induced by excimer laser irradiation  
**M. Niyaz Ahamad** and K.B.R. Varma

- [Journal of American Ceramic Society](#), 92 [11] (2009) 2609.
7. Structural and optical properties of  $(100-x)\text{Li}_2\text{B}_4\text{O}_7 - x(\text{Ba}_5\text{Li}_2\text{Ti}_2\text{Nb}_8\text{O}_{30})$  glasses and glass nanocrystal composites  
**M. Niyaz Ahamad** and K.B.R. Varma  
[Dalton transactions](#), 39 (2010) 4624.
  8. Dielectric properties of  $(100-x)\text{Li}_2\text{B}_4\text{O}_7 - x(\text{Ba}_5\text{Li}_2\text{Ti}_2\text{Nb}_8\text{O}_{30})$  glasses and glass nanocrystal composites  
**M. Niyaz Ahamad** and K.B.R. Varma  
[Materials Science and Engineering: B](#), 167 [3] (2010) 193.
  9. Impedance spectroscopic studies on  $\text{LiKB}_4\text{O}_7$  glasses  
G. Paramesh, **M. Niyaz Ahamad**, K.R.S. Preethi Meher and K.B.R. Varma  
[Integrated ferroelectrics](#) 118 (2010) 95.
  10. Calorimetric studies on  $2\text{TeO}_2\text{-V}_2\text{O}_5$  glass  
**M. Niyaz Ahamad**, Rahul Vaish and K.B.R. Varma  
[Journal of thermal analysis and calorimetry](#) 105 [1] (2011) 239.
  11. Extraordinary high dielectric constant, electrical and magnetic properties of ferrite nanoparticles at room temperature.  
Khalid Mujasam Batoo, Feroz Ahmed Mir, M.S. Abd El-sadek, Md. Shahabuddin, **Niyaz Ahmed**  
[Journal of Nanoparticle Research](#) 15 (2013) 2067.
  12. Optimal Materials for Thermal Energy Efficient Smart Architecture  
Gaurav Vats, **Niyaz Ahamad Madhar**, Mohammed Shahabuddin, Jafar M. Parakkandy, Khalid Mujasam Batoo and Rahul Vaish.  
[International Journal of Green Energy](#) (communicated 2013)
  13. Application Oriented Selection of Optimal Sintering Temperature form User Perspective: A study on  $\text{K}_{0.5}\text{Na}_{0.5}\text{NbO}_3$  Ceramics  
Gaurav Vats, Manish Sharma, Rahul Vaish, Vishal Singh Chauhan, **Niyaz Ahamad Madhar**, Mohammed Shahabuddin, Jafar M. Parakkandy and Khalid Mujasam Batoo  
[International Journal of Applied Ceramic Technology](#) (communicated 2014)

## Conference presentations

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14. Multifunctional glass nanocrystal composite in the system  $(100-x)\text{TeO}_2 - x(1.5\text{K}_2\text{O-Li}_2\text{O-2.5Nb}_2\text{O}_5)$   
**M. Niyaz Ahamad** and K.B.R. Varma  
"Functional Metamaterials at the Nanoscale - 2005" held at Indian Institute of Science, Bangalore, India.
15. Multifunctionalities of nanocrystals embedded in transparent glass matrices  
**M. Niyaz Ahamad** and K.B.R. Varma

"Symposium for Division of Chemical Sciences" at Indian Institute of Science, Bangalore, India.

16. Dielectric relaxation in  $\text{Te}_2\text{V}_2\text{O}_9$  ceramic  
**M. Niyaz Ahamad**, K.R.S. Preethi Meher, G. Paramesh and K.B.R. Varma  
"International conference on electroceramics – 2009" held in Delhi, India.
17. Magnetoelectric properties of  $\text{Bi}_4\text{Ti}_3\text{O}_{12}\text{-Bi}_{1-x}\text{La}_x\text{FeO}_3$  system  
K.R.S. Preethi Meher, **M. Niyaz Ahamad** and K.B.R. Varma  
"International conference on electroceramics – 2009" held in Delhi, India.
18. Impedance spectroscopic studies on  $\text{LiKB}_4\text{O}_7$  glasses  
G. Paramesh, **M. Niyaz Ahamad**, K.R.S. Preethi Meher and K.B.R. Varma  
"International conference on electroceramics – 2009" held in Delhi, India.

## Personal details

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<b>Date of Birth</b>	:	11 <sup>th</sup> May 1980
<b>Place of Birth</b>	:	Vellore, Tamil Nadu, India
<b>Nationality</b>	:	Indian
<b>Sex</b>	:	Male
<b>Marital status</b>	:	Married
<b>Languages known (To speak, read and write)</b>	:	English, Tamil, Hindi, Urdu
<b>Hobbies &amp; Interests</b>	:	Browsing and poetry

## References

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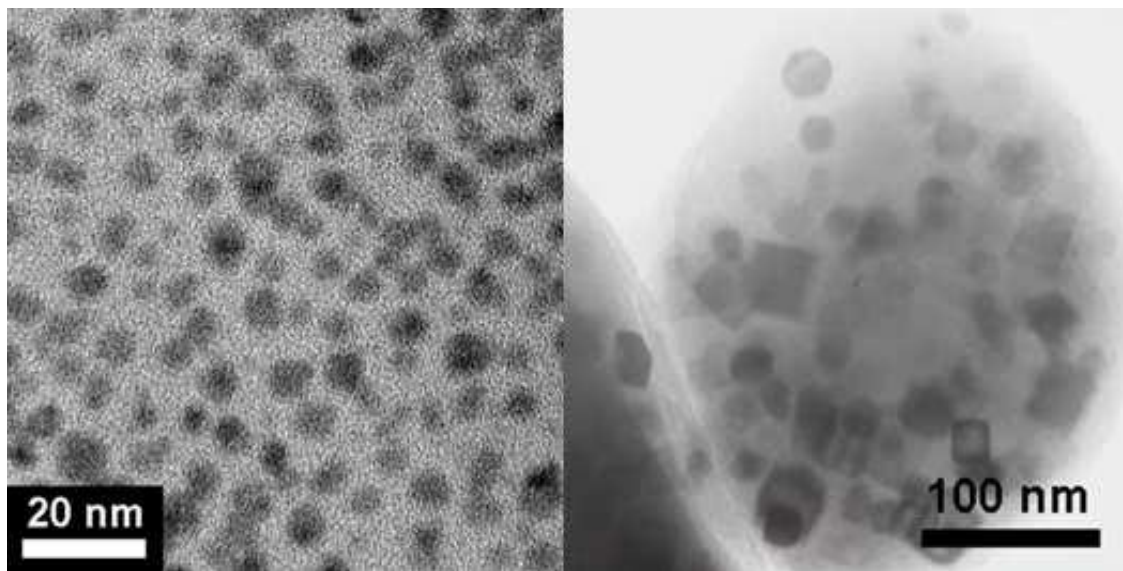
1. **Prof. K. B. R. Varma**  
Professor and Chairman (Thesis supervisor)  
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2. **Prof. Himanshu Jain**  
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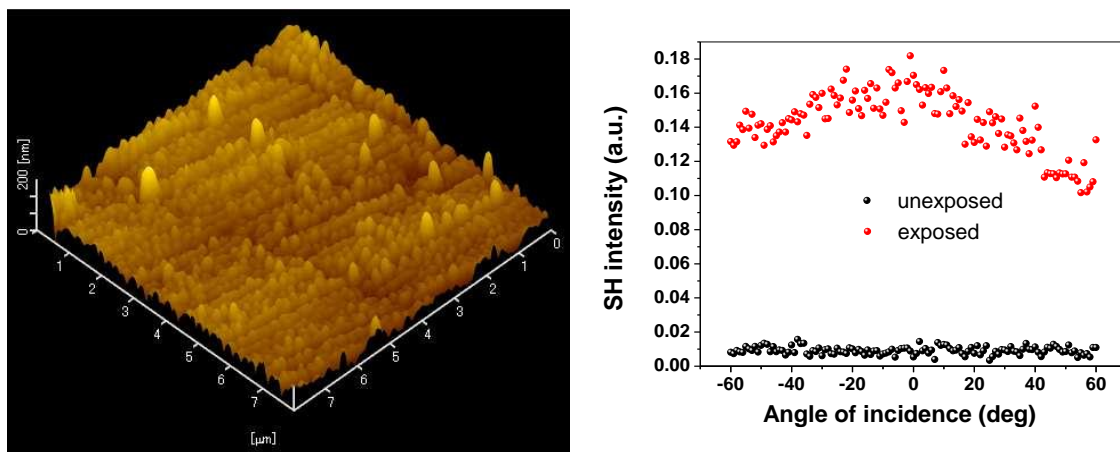
## Graphical research summary

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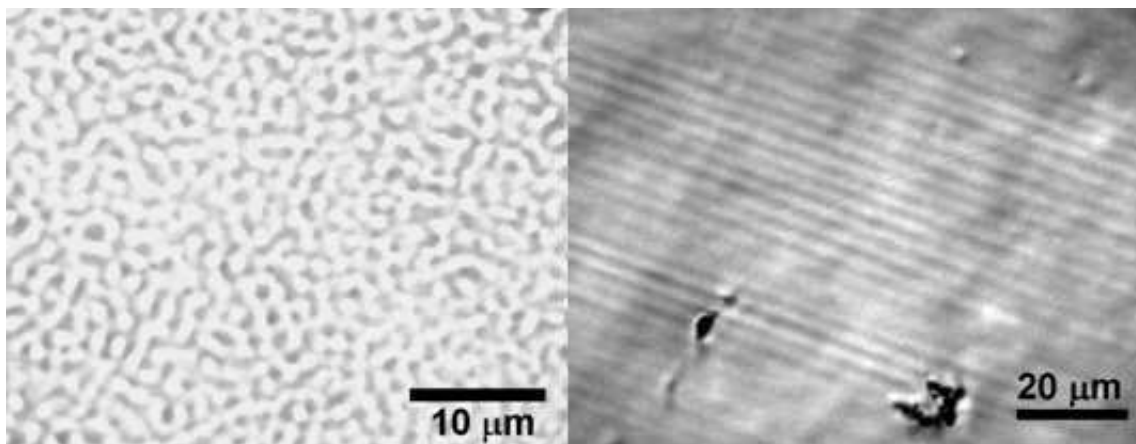
**Left:** TEM micrograph of  $\text{K}_3\text{Li}_2\text{Nb}_5\text{O}_{15}$  nanocrystals grown inside  $\text{TeO}_2$  glass matrix

**Right:** TEM micrograph of  $\text{Ba}_5\text{Li}_2\text{Ti}_2\text{Nb}_8\text{O}_{30}$  nanocrystals grown inside  $\text{Li}_2\text{B}_4\text{O}_7$  glass matrix



**Left:** AFM images showing nanopatterning of  $\text{K}_3\text{Li}_2\text{Nb}_5\text{O}_{15}$  nanocrystal lines on  $\text{TeO}_2$  glass matrix induced by excimer laser irradiation

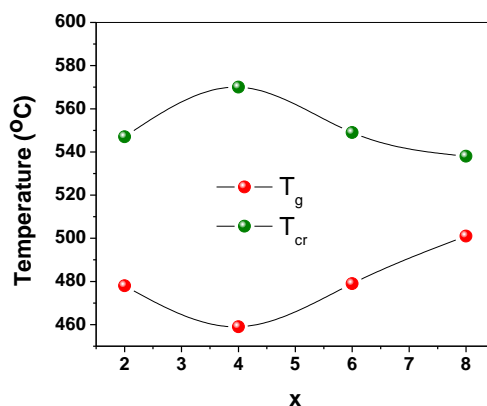
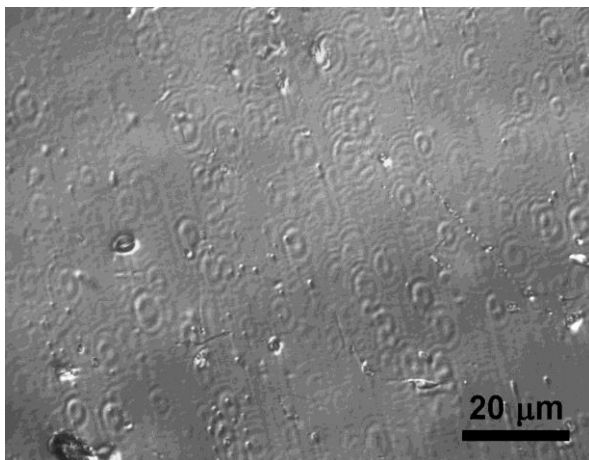
**Right:** Second harmonic generation demonstrated from these nanocrystalline lines patterns



**Left:** Spinodal decomposition demonstrated in tellurite glasses by excimer laser irradiation

**Right:** Line patterns demonstrated on tellurite glasses by excimer laser irradiation





**Left:** Ring patterns linearly arranged on tellurite glasses as a consequence of excimer laser irradiation

**Right:** Glass transition temperature ( $T_g$ , highest ever reported for tellurite glasses) and crystallization temperature ( $T_{cr}$ ) for the tellurite glasses in the system  $(100-x)\text{TeO}_2 - x(\text{Ba}_5\text{Li}_2\text{Ti}_2\text{Nb}_8\text{O}_{30})$