LIQUID CRYSTAL RESEARCH CENTRE (LCRC-R&D)

1.0 Introduction to the Center

The Liquid Crystal Research Centre headed by Prof. VGKM Pisipati in K L University, has been working in the area of liquid crystals from the past four years. The major work done in our laboratory is design, synthesis of new materials, characterization of different liquid crystalline phases and physical properties studies like dilatometry, optical birefringence, molecular polarizabilities, dielectric anisotropies, spontaneous polarization for the case of ferroelectric liquid crystals. All these studies have been carried out on different variety of Schiff base liquid crystal compounds such as nO.m, n.Om, nO.Om, n.m., PBnA, PBOnA, and TBnA series. The work is not only confined to monomers, in view of the importance it is extended to dimeric liquid crystals.

Recently, our group has entered into new fields in application point of view such as nanotechnology and liquid crystal antennas. So, far we have communicated a good number of publications in the area of liquid crystal antennas and some prototype models are fabricated and tested.

Associated Members of LCRC-R&D

<table>
<thead>
<tr>
<th>S.No</th>
<th>Employee Number</th>
<th>Name</th>
<th>Designation</th>
<th>Experience in KLU</th>
<th>Research Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1719</td>
<td>Prof. VGKM Pisipati</td>
<td>Director</td>
<td>4.5 Years</td>
<td>Liquid Crystals</td>
</tr>
<tr>
<td>2</td>
<td>1737</td>
<td>B.T.P.Madhav</td>
<td>Assoc. Professor</td>
<td>4.5 Years</td>
<td>Antennas</td>
</tr>
<tr>
<td>3</td>
<td>1751</td>
<td>D. Madhavi latha</td>
<td>WOS</td>
<td>4 Years</td>
<td>Liquid Crystals</td>
</tr>
</tbody>
</table>
2.0 Details of the equipment available in the center

<table>
<thead>
<tr>
<th>Serial Number</th>
<th>Department</th>
<th>Name of the Equipment</th>
<th>Purpose of the Equipment</th>
<th>Organization from which the equipment is purchased</th>
<th>Year</th>
<th>Cost of the equipment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>ECE</td>
<td>Differential Scanning calorimeter</td>
<td>To find the properties of Liquid crystals</td>
<td>Perkin Elmer</td>
<td>2008</td>
<td>20 Lakhs</td>
</tr>
<tr>
<td>2</td>
<td>ECE</td>
<td>Polarizing Microscope</td>
<td>To verify Phase changes in Liquid crystals</td>
<td>SV Techs</td>
<td>2008</td>
<td>1,55,480Rs</td>
</tr>
<tr>
<td>3</td>
<td>ECE</td>
<td>Electronic Balance</td>
<td>To find mass of Liquid crystal compound samples</td>
<td>K-Roy</td>
<td>2009</td>
<td>11,440 Rs</td>
</tr>
<tr>
<td>4</td>
<td>ECE</td>
<td>LCAS-III Spectrometer with Accessories</td>
<td>Liquid crystal Material and Analysis</td>
<td>LC Vision LLC</td>
<td>2010</td>
<td>34,000$</td>
</tr>
<tr>
<td>5</td>
<td>ECE</td>
<td>Lock in Amplifier</td>
<td>Gain Measurements</td>
<td>Stanford Research Systems</td>
<td>2011</td>
<td>8 Lakhs</td>
</tr>
<tr>
<td>6</td>
<td>ECE</td>
<td>Index Power Systems</td>
<td>Uninterrupted Power Supply</td>
<td>Index Power Systems</td>
<td>2012</td>
<td>11,900 Rs</td>
</tr>
<tr>
<td>7</td>
<td>ECE</td>
<td>LG-REF-205 KL4ERLZPST</td>
<td>Mega Shopee</td>
<td>To Preserve Liquid Crystal Materials</td>
<td>2012</td>
<td>10,100 Rs</td>
</tr>
</tbody>
</table>
Photograph of DSC and its Interfacing at LCRC-R&D

LCAS Setup
3.0 List of software packages being used in the Lab

<table>
<thead>
<tr>
<th>S.No</th>
<th>Name of the Software</th>
<th>Name of the Manufacturer</th>
<th>Version</th>
<th>No. of User Licenses</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Pyris</td>
<td>Perkin Elmer</td>
<td>V9.0.1</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>Cranes</td>
<td>Cranes Software International Ltd</td>
<td>V1.0</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>Software Utilities</td>
<td>Perkin Elmer</td>
<td>V7.0</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>HFSS</td>
<td>Ansoft</td>
<td>V11.0</td>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td>LCA’S</td>
<td>LCAS Systems</td>
<td>V4.0</td>
<td>1</td>
</tr>
<tr>
<td>6</td>
<td>Matlab</td>
<td>Mathworks</td>
<td>10</td>
<td>2</td>
</tr>
</tbody>
</table>

4.0 List of faculty connected with the Lab

<table>
<thead>
<tr>
<th>S.No</th>
<th>Employee Number</th>
<th>Name</th>
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<td>D. Madhavi latha</td>
<td>WOS</td>
<td>4 Years</td>
<td>Liquid Crystals</td>
</tr>
</tbody>
</table>
5.0 List of Sponsored Research Projects being undertaken/completed in the Lab

<table>
<thead>
<tr>
<th>S.No</th>
<th>Name of the project</th>
<th>Type of project</th>
<th>Faculty Member/Principal Investigator</th>
<th>Amount in Rs</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Phase transition studies on dimeric liquid crystals</td>
<td>Department of Science and Technology (Grant No: SR/S2/CMP-0071/2008)</td>
<td>Prof. VGKM Pisipati</td>
<td>26,00,000</td>
</tr>
<tr>
<td>2</td>
<td>Optical studies on nano particle doped liquid crystals</td>
<td>DST-WOS-A through grant No.SR/WOS-A/PS-05/2010</td>
<td>D. Madhavi Latha</td>
<td>10,96,000</td>
</tr>
<tr>
<td>3</td>
<td>Substrate Permittivity effects on the design of compact and broadband antennas</td>
<td>DST-Fast Track Scheme (Applied)</td>
<td>B.T.P.Madhav</td>
<td>23,00,000</td>
</tr>
<tr>
<td>4</td>
<td>Design of low cost amateur radio satellite compatible Transceiver Setup’s for operation and Quick Establishment of communication platforms for during disaster situation</td>
<td>AICTE under Research Promotion Scheme</td>
<td>B.T.P.Madhav (Co-Investigator)</td>
<td>9,28,000</td>
</tr>
<tr>
<td>5</td>
<td>Design and Analysis of EBG Structured Slot Antenna for Reduction of Size and Surface Wave Losses</td>
<td>In-House Funding Scheme</td>
<td>B.T.P.Madhav</td>
<td>5,00,000</td>
</tr>
</tbody>
</table>

74, 24,000/-

6.0 List of Publications Related to the center

**Publications in Liquid crystals from 2009-2011**


7. P.V. Datta Prasad, M. Ramakrishna Nanchara Raoa, J. Lalithakumari, V.G.K.M. Pisipati; Simultaneous characterisation and dilatometry studies on liquidcrystalline n-(p-n-decylxy and undecyloxybenzylidene)-p-toluidines; Physics and Chemistry of Liquids, 47, 2, 2009, 123–132

8. V. G. K. M. Pisipati and P. V. Datta Prasad; Orientational order parameter in homogeneous binarymixtures of 60.4+40.6 of n-(p-alcoxybenzylidene)- p-n-alkyl anilines, (no.m)series – a birefringence method; Mol. Cryst. Liq.Cryst., 506, 13–21, 2009


18. I. M. Ramakrishna Nanchara Rao, P. V. Datta Prasad, D. Madhavi Latha and V. G. K. M. Pisipati: Phase transition studies and thermodynamic parameters of four members of nO.m series - A Dilatometric study, Molecular Crystals and Liquid Crystals (2011):


21. D. Madhavi Latha, V. G. K. M. Pisipati, M. Ramakrishna Nanchara Rao and P. V. Datta Prasad: Estimation of thermodynamic and Beyer’s parameter (B/A) in Liquid Crystalline 5.m, 5O.m, 5.Om, 5O.Om compounds with m = 5 and 16, Physica B 406: 3821-3824 (2011)


37. Potapragada V. Datta Prasad, G.Padmaja Rani and Venkata G.K.M. Pisipati; Phase transition, birefringence and orientational order parameter studies in four members of benzylidene aniline Liquid crystals; Solid state Phenomenon


Chapter in Text book
An overview of liquid crystals based on Schiff’s base compound
Shankar B. Rananavare & V.G.K.M. Pisipati
Department of Chemistry, Portland State University, Portland OR 97206 USA
Liquid Crystal Research Centre, ECE Department, Koneru Lakshmaiah University, Vaddeswaram, 522 502, India

Publications in Antennas and Liquid Crystal Antennas from 2009-12

International Journals


45) B.T.P.Madhav, K V L Bhavani, Prof. VGKM Pisipati, Venkata Ravi Teja.K, K. Rajkamal, K.V.V.Kumar, “Dual Polarized 16X16 MSPA Antenna Using FR4


101) G. Asa Jyothi, P. Siddaiah, B. Prabhakar Rao, **B.T.P.Madhav,**” Pyramidal Serrated Antenna Performance Evaluation Based on Element Spacing”, IJECT , ISSN : 2230-7109 (Online) , 2230-9543 (Print), Vol. 4, Issue 1, Jan - March 2013, pp 419-421. IF: 0.306.


**National Journals**


**International Conferences**


**National Conferences**


2) K V L Bhavani, **B.T.P.Madhav** , P.Poorna Priya, K Pranob Charless,” VEHICLE TRACKING SYSTEM USING ARM MICROCONTROLLER BASED ON GPS”, NCSCV- 10NATIONAL CONFERENCE ON SIGNAL PROCESSING COMMUNICATIONS& VLSI DESIGN.

3) K Pranob Charless, **B.T.P.Madhav** , K V L Bhavani, P.Poorna Priya, ” Au Courant Advent for Denoising and Compression of ECG Signal”, NCSCV- 10NATIONAL CONFERENCE ON SIGNAL PROCESSING COMMUNICATIONS& VLSI DESIGN.


**Total Number of Publications in LCRC-R&D = 145**
## 7.0 List of B.Tech Projects Conducted in the Lab

**List of B.Tech Projects conducted in the Lab (LCRC)**

<table>
<thead>
<tr>
<th>S.N0.</th>
<th>Title of Project</th>
<th>Student Name &amp; Roll No.</th>
<th>Year of Project</th>
<th>Faculty Supervisor</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Blind Bandwidth Estimation of the communication signal</td>
<td>B.V.S.A.Pavan Kumar(Y6EC318)</td>
<td>2009-10</td>
<td>B.T.P.Madhav</td>
</tr>
<tr>
<td></td>
<td></td>
<td>B.V.Naik(L7EC340)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>J.Lavanya Ambica(Y6EC244)</td>
<td></td>
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<tr>
<td>2</td>
<td>Microstrip Planar Dipole Array Antenna</td>
<td>Ch.Pushpalatha(Y7EC265)</td>
<td>2010-11</td>
<td>B.T.P.Madhav</td>
</tr>
<tr>
<td></td>
<td></td>
<td>G.Naveen Kumar(Y7EC251)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>J.Victor Paul(Y7EC329)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Performance Evaluation of Rectangular Microstrip Patch Array Antenna for Different Dielectric constants</td>
<td>A.Snehitha(Y7EC300)</td>
<td>2010-11</td>
<td>B.T.P.Madhav</td>
</tr>
<tr>
<td></td>
<td></td>
<td>P.Sreyesh(Y7EC306)</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>V.Saty sainath(Y7EC296)</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Saroj Gautham(Y7EC294)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Performance Evaluation of Array Antenna by changing the dimensional Characterisation</td>
<td>K.Guru Pavani(Y8EC260)</td>
<td>2011-12</td>
<td>B.T.P.Madhav</td>
</tr>
<tr>
<td></td>
<td></td>
<td>M.Ravindra(Y8EC278)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>N.Revanth Teja(Y8EC288)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Reduction of Harmonics and Surface wave Losses in Serrated MSPA Using 2D-EBG Structures</td>
<td>Atejaswini, Kharahari, Bhaskar Teja, Krishna Chaitanya</td>
<td>2012-13</td>
<td>B.T.P.Madhav</td>
</tr>
<tr>
<td>6</td>
<td>Compact Sierpinski Carpet Antenna on Destructive Ground Plane</td>
<td>G. Vaishnavi, V. Manichandana, Ch Harinath Reddy, S. Ravi Teja</td>
<td>2012-13</td>
<td>B.T.P.Madhav</td>
</tr>
</tbody>
</table>

## 8.0 List of M.Tech Projects Conducted in the Lab

**List of M.Tech Projects conducted in the Lab (LCRC)**

<table>
<thead>
<tr>
<th>S.N0.</th>
<th>Title of Project</th>
<th>Student Name &amp; Roll No.</th>
<th>Year of Project</th>
<th>Faculty Supervisor</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Design and Development of Broadband Balanced Antipodal Antenna for Phased Array Applications</td>
<td>Y.L.Swetha(09102122)</td>
<td>2010-11</td>
<td>B.T.P.Madhav</td>
</tr>
<tr>
<td>2</td>
<td>Compact Planar Inverted-F Antenna for Bluetooth and WiMAX Application</td>
<td>Manoj Kumar(10102176)</td>
<td>2011-12</td>
<td>B.T.P.Madhav</td>
</tr>
<tr>
<td>3</td>
<td>Fractal Shaped Sierpinski on EBG Structured Ground Plane</td>
<td>Dhatri</td>
<td>2013-13</td>
<td>B.T.P.Madhav</td>
</tr>
<tr>
<td>4</td>
<td>Ultra Wide Band Notched printed Compact Antenna</td>
<td>K.Naresh babu</td>
<td>2012-13</td>
<td>B.T.P.Madhav</td>
</tr>
</tbody>
</table>
9.0 List of PhD Projects Conducted in the Lab:

<table>
<thead>
<tr>
<th>S.No</th>
<th>Title of Project</th>
<th>Scholar name</th>
<th>Year of Project</th>
<th>Faculty/Supervisor</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Thermal and optical properties of some 7O.Om liquid crystalline compounds</td>
<td>Miss D. Madhavi Latha</td>
<td>Ph.D. Thesis submitted in July 2012.</td>
<td>Dr. VGKM Pisipati</td>
</tr>
<tr>
<td>2</td>
<td>Substrate permittivity effects on the performance of compact and broad band antennas</td>
<td>Mr. B. T. P. Madhav</td>
<td>Pre-Ph.D. Completed in Nov. 2012</td>
<td>Dr. Habibullah Khan and Dr. VGKM Pisipati</td>
</tr>
</tbody>
</table>

10.0 List of Working Models in Existence in the Center

<table>
<thead>
<tr>
<th>S.No</th>
<th>Title of the model</th>
<th>Cost of the development of the model</th>
<th>Specification and working of the model</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Liquid Crystal rectangular patch antenna</td>
<td>Rs. 5,000/-</td>
<td>Testing at RCI, Hyderabad.</td>
</tr>
<tr>
<td>2</td>
<td>Liquid Crystal circular patch antenna</td>
<td>Rs. 5,000/-</td>
<td>Testing at RCI, Hyderabad.</td>
</tr>
<tr>
<td>3</td>
<td>T-Slotted Microstrip Patch Antenna</td>
<td>Rs. 3,000/-</td>
<td>M.Tech Project Batch-2012-13</td>
</tr>
<tr>
<td>4</td>
<td>Serrated Fractal Antenna</td>
<td>Rs. 5,000/-</td>
<td>B.Tech Project Batch-2012-13</td>
</tr>
<tr>
<td>5</td>
<td>Slotted Aperture Antenna</td>
<td>Rs. 5,000/-</td>
<td>B.Tech Project Batch</td>
</tr>
</tbody>
</table>

11.0 Budget details for the last 4 Years The following amounts are received from

1. The management KL University ---- Rs. 22,00,000/-
2. Department of science and technology, New Delhi --- Rs. 26,00,000/-
3. DST WOS, New Delhi --- Rs. 11,00,000/-
   Total amount has been spent in purchasing the equipment (50, 00,000/-) and chemicals (8, 00,000/-), Stationary etc.

12.0 Research Collaborations with Outside World

1) RCI Hyderabad, EMI/EMC wing regarding Antennas Testing
2) SD Polymers, Machilipattanam regarding Liquid Crystal Compounds preparation.
3) Atlantic Circuits, Hyderabad for Fabrication of Antennas.