

## Biodata

Name	N. Raghu 
Designation	Director, C-MET, Thrissur
Educational qualification	Ph.D from Materials Research Centre, IISc., Bangalore. Post- Doc – Penn State University – USA
S & T Research Area and Contribution	<ul style="list-style-type: none"> <li>• Actuators</li> <li>• Multilayer ceramics</li> <li>• Electronic Packaging Materials</li> </ul> <p>His group established Multilayer ceramics laboratory that led to the development of various Multilayer (ML) devices such as actuators (including piezo actuator designs such as, ML Electrostrictive, Flextensional, ring type, Bimorph etc.), ML capacitors and electronic packaging materials and components including microwave materials (LTCC and ULTCC) especially for strategic sector.</p>
Recognised Awards/Honors/Fellow	<ul style="list-style-type: none"> <li>• Member of the Materials Research society of India</li> <li>• Was member of American Ceramic Society for more than a decade</li> <li>• Had served as a member of the Naval Research Board (Materials).</li> </ul>
Projects	<p>On-going:</p> <ol style="list-style-type: none"> <li>1. Supply of amplified linear piezoactuator for use in breathing regulators for aircrew - DEBEL (DRDO) - (2018-2020).</li> </ol> <p>Completed:</p> <ol style="list-style-type: none"> <li>1. Development of multilayer pmn-pt electrostrictive actuators – NPSM - (2002 -2005)</li> <li>2. Phase-pure Ba<sub>2</sub>Ti<sub>9</sub>O<sub>20</sub> (2:9) ceramics for cog capacitor &amp; microwave dielectric applications – DST - (2003 -2005)</li> <li>3. Development of low-voltage piezoelectric ml actuators- BARC - (2003 -2006)</li> <li>4. Design, prototyping &amp; evaluation of ML actuators – NPOL (DRDO) – (2006-2007)</li> <li>5. Development of PZT based flextensional (FT) actuators – RCI (DRDO) – (2006-2007)</li> <li>6. Development and supply of twin amplified piezo micro actuator – RCI (DRDO) – (2008-2010)</li> </ol>

	<ol style="list-style-type: none"> <li>7. Piezo electric based bimorph mirror –BRNS (DAE) – (2009-2011)</li> <li>8. Development of low temperature composition &amp; multilayer actuator for potential automobile / aerospace applications – NPSM – (2010-2012)</li> <li>9. Design &amp; development of piezoelectric multilayer actuator for mems based micro valve – LEOS (ISRO) -(2010-2013)</li> <li>10. Development of Itcc material for general purpose applications - DST - (2012-2016)</li> <li>11. Aluminum inrternal electrode based ultra low temperature co-fired ceramics (u-ltcc) for microwave electronic packaging applications - BRNS (DAE) – (2015-2018)</li> <li>12. Textured PMN-PT piezo ceramic – SERB – (2015-2018)</li> </ol>
<p style="text-align: center;"><b>Publications/Patents (Past 5 years)</b></p>	<p><b>Patents</b></p> <ol style="list-style-type: none"> <li>1. Lead free glass as microwave dielectric material and glass + ceramic compositions for ultra low temperature Co-firable Ceramic (u-LTCC) application, N. Raghu, Mewin Vincent, Afsal P. M., Vasanthakumari K.G., Susanth S and T. Radhika, Application No.1372/DEL/2015.</li> <li>2. Anorthite based glass + ceramic low temperature co-firable ceramic compositions &amp; method of making green tapes with tailored mechanical properties, N. Raghu, T. Radhika, Vasanthakumari K.G., Susanth S, Mewin Vincent and Afsal P. M., Application No. 2348/DEL/2015.</li> </ol> <p><b>Publications</b></p> <ol style="list-style-type: none"> <li>1. Vincent, M., Afsal, P. M., Vasanthakumari, K. G., Susanth, S., Radhika, T., &amp; Raghu, N. (2018). Influence of fillers on the re-crystallization and dielectric properties of 60ZnO-30B<sub>2</sub>O<sub>3</sub>-10SiO<sub>2</sub> glass. Journal of Electroceramics, 40(3), 219–224, May 2018. (IF – 1.42)</li> <li>2. Factors influencing rheological characteristics of silver thick film paste and its correlation to multilayer ceramic processing, Mewin Vincent, Vasanthakumari Kalarickal Gopalakrishnan, Susanth Sivanandan, Thankappan Radhika &amp; Natarajan Raghu, Advances in Applied Ceramics, 117, Oct 2018, 1–8. (IF-1.09)</li> <li>3. Aluminium Paste formulation and it suitability in multilayer co-fired Bi<sub>2</sub>Mo<sub>2</sub>O<sub>9</sub> u-LTCC ceramics, J. Eur. ceramics Society - Submitted.</li> <li>4. Phase evolution and stability of Bi<sub>2</sub>Mo<sub>2</sub>O<sub>9</sub> microwave u-LTCC ceramics - Phase transitions (Submitted).</li> <li>5. ML PZN-PZT Piezo ceramics with Ag/Pd paste – Advances in Applied Ceramics – Submitted.</li> </ol>