

Carl P. Romao

Professional Experience

- University of Tübingen, Tübingen, Germany
 - Postdoctoral Researcher 01/10/2018–present
 - Teach@Tübingen Postdoctoral Fellow 01/10/2018–30/09/2019
- University of Oxford, Oxford, United Kingdom
 - NSERC Postdoctoral Fellow 01/09/2016–31/08/2018
- Dalhousie University, Halifax, Canada
 - Postdoctoral Research Assistant 30/09/2015–13/07/2016
 - Teaching Assistant 07/09/2010–04/04/2014

Education

- Dalhousie University, Halifax, Canada 07/09/2010–29/09/2015
 - Ph.D. in Chemistry — thesis entitled “Thermoelastic Properties of Materials with Negative Coefficients of Thermal Expansion”
- McGill University, Montreal, Canada 06/09/2005–25/05/2009
 - B.Sc. in Chemistry with Honours

Research Experience

- Institute for Inorganic Chemistry, University of Tübingen 01/10/2018–present
 - Postdoctoral research in the laboratory of Prof. Hans-Jürgen Meyer.
 - Responsible for the determination of electronic and phononic properties of novel materials synthesized in the Meyer group using *ab initio* computational techniques. Predicted the modification of Weyl semimetallicity and charge density wave formation in WTe_2 by intercalation of iodine to form WTe_2I . Established relationships between electronic structure, crystallographic structure, and electronic properties in a series of novel Sn^{2+} -containing inorganic compounds. Performed independent research which established a connection between phonon chirality and negative thermal expansion.
- Department of Chemistry, University of Oxford 01/09/2016–31/08/2018
 - Independent postdoctoral research in the laboratory of Prof. Andrew Goodwin.
 - Developed a theoretical model linking anisotropic elasticity to anisotropic thermal expansion, allowing prediction of anomalous axial thermal expansion based on symmetry constraints. Validated this model through *ab initio* calculations of thermal expansion, and used it to predict the thermal expansion of novel compounds and to identify connections between crystallographic symmetry and anomalous thermal expansion.
- Department of Chemistry, Dalhousie University 07/09/2010–13/07/2016
 - Doctoral and postdoctoral research under the supervision of Prof. Mary Anne White.
 - Synthesized novel negative thermal expansion (NTE) ceramics and composites containing NTE materials. Characterized the thermoelastic, structural, and vibrational properties of such materials experimentally and computationally in order to establish structure-property relationships, investigate correlations between thermal and elastic properties, and examine the effect of elastic properties on bulk thermal expansion in polycrystals and composites.
- Department of Chemistry, McGill University 02/09/2008–10/04/2009
 - Honours thesis research under the supervision of Prof. Ian Butler and Prof. Denis Gilson.
 - Synthesized NTE cadmium cyanide, its clathrates, and related materials, and investigated their vibrational spectra under pressure.

Teaching Experience

- Institute for Inorganic Chemistry, University of Tübingen 01/10/2018–present
 - Lecturer for graduate students on topics in materials chemistry.
 - Responsibilities included design of the curriculum and preparation of lectures.
- Department of Materials Engineering, PUC-Rio 25/01/2016–05/02/2016
 - Taught a hands-on training course on finite element analysis and its application to modeling of thermoelasticity at the microscale.
- Department of Chemistry, Dalhousie University 07/09/2010–04/04/2014
 - Teaching Assistant for undergraduate laboratory courses.
 - Responsibilities included instruction of students and evaluation of reports.

Selected Publications

1. P. Schmidt, P. Schneiderhan, M. Ströbele, **C.P. Romao**, H.-J. Meyer (15/01/2021) Reversible Iodine Intercalation into Tungsten Diteelluride. *Inorg. Chem.* 60, 1411–1418. doi:10.1021/acs.inorgchem.0c02676.
2. **C.P. Romao** (21/08/2019) Anomalous thermal expansion and chiral phonons in BiB₃O₆. *Phys. Rev. B* 100, 060302(R). doi:10.1103/PhysRevB.100.060302.
3. M. Löber, K. Dolabdjian, M. Ströbele, **C.P. Romao**, H.-J. Meyer (05/06/2019) Synthesis, Structure, and Electronic Properties of Sn(CN₂) and Sn₄Cl₂(CN₂)₃. *Inorg. Chem.* 58, 7845–7851. doi:10.1021/acs.inorgchem.9b00527.
4. K. Dolabdjian, A. Kobald, **C.P. Romao**, H.-J. Meyer (06/07/2018) Synthesis and Thermoelastic Properties of Zr(CN₂)₂ and Hf(CN₂)₂. *Dalton Trans.* 47, 10249–10255. doi:10.1039/C8DT02001A.
5. M.A. White, J. Conrad, R. Chen, **C. Romao**, A. Pereira, I. Hill (23/03/2018) Applications of ice-templated ceramics. *Int. J. Appl. Ceram. Technol.* 15, 1075–1083. doi:10.1111/ijac.12896.
6. **C.P. Romao** (18/10/2017) Anisotropic thermal expansion in flexible materials. *Phys. Rev. B* 96, 134113. doi:10.1103/PhysRevB.96.134113.
7. **C.P. Romao**, S.P. Donegan, J.W. Zwanziger, M.A. White (24/10/2016) Relationships between elastic anisotropy and thermal expansion in A₂Mo₃O₁₂ materials. *Phys. Chem. Chem. Phys.* 18, 30652–30661. doi:10.1039/C6CP06356J.
8. **C.P. Romao** and M.A. White (19/07/2016) Negative stiffness in ZrW₂O₈ inclusions as a result of thermal stress. *Appl. Phys. Lett.* 109, 031902. doi:10.1063/1.4959094.
9. **C.P. Romao**, F.A. Perras, U. Werner-Zwanziger, J.A. Lussier, K.J. Miller, C.M. Calahoo, J.W. Zwanziger, M. Bieringer, B.A. Marinkovic, D.L. Bryce, M.A. White (23/03/2015) Zero Thermal Expansion in ZrMgMo₃O₁₂: NMR Crystallography Reveals Origins of Thermoelastic Properties. *Chem. Mater.* 27, 2633–26476. doi:10.1021/acs.chemmater.5b00429.
10. **C.P. Romao**, C.R. Morelock, M.B. Johnson, J.W. Zwanziger, A.P. Wilkinson, M.A. White (18/02/2015). The Heat Capacities of Thermomiotic ScF₃ and ScF₃-YF₃ Solid Solutions. *J. Mater. Sci.* 80, 3409–3415. doi:10.1007/s10853-015-8899-y.

Invited Presentations

- **C.P. Romao** (02/09/2019) Chiral phonons and anomalous thermal expansion in BiB₃O₆. International Conference on Auxetics and Other Materials and Models with “Negative” Characteristics, Będlewo, Poland.
- **C.P. Romao** (11/09/2017) Structure–property relationships in materials with anomalous thermoelastic behaviour. International Conference on Auxetics and Other Materials and Models with “Negative” Characteristics, Heraklion, Greece.
- **C.P. Romao**, J.W. Zwanziger, and M.A. White (14/09/2015) Elastic Properties and Their Relationships to the Thermal Expansion of Thermomiotic Materials. International Conference on Auxetics and Other Materials and Models with “Negative” Characteristics, Buggiba, Malta.

Prizes and Awards

- Kenneth T. Leffek Prize 11/09/2015
 - Awarded annually to the best Ph.D. thesis defended in the Department of Chemistry at Dalhousie University.
- 1st place, poster competition, High Performance Computing Symposium 27/06/2014
- Douglas E. Ryan Prize 09/09/2011, 06/09/2013
 - Awarded for excellence in research productivity as a graduate student in the Department of Chemistry at Dalhousie University.

Funding

- Teach@Tübingen Fellowship 01/10/2018–30/09/2019
- NSERC Postdoctoral Fellowship 01/09/2016–31/08/2018
- Walter C. Sumner Memorial Fellowship 01/09/2013–31/08/2015

Supervision and Mentoring

- Institute for Inorganic Chemistry, University of Tübingen 01/01/2019–present
 - Jointly responsible (with Prof. H-J. Meyer) for the training of students working on projects in computational chemistry. One manuscript incorporating electronic structure calculations performed by these students has been published (*Inorg. Chem.* 58, 14560–14567) and another is in preparation.
- Department of Chemistry, Dalhousie University 07/05/2013–21/08/2013, 04/05/2015–13/07/2016
 - Jointly responsible (with Prof. M.A. White) for the supervision and training of two undergraduate research assistants working on projects involving freeze-casting of ceramics. Each of the students' work was later incorporated in a publication (*Int. J. Appl. Ceram. Technol.* 15, 1075–1083 and *Ceramics* 2, 112–125).

Peer Review

- 17 manuscripts refereed for journals including *Nature Communications* and *J. Am. Chem. Soc.*
 - Verified by Publons, see <https://publons.com/researcher/1192302/carl-romao/>.