

University of Groningen

Understanding and control of the metallic state in epitaxial NdNiO₃

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DOI:
[10.33612/diss.180302851](https://doi.org/10.33612/diss.180302851)

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Document Version
Publisher's PDF, also known as Version of record

Publication date:
2021

[Link to publication in University of Groningen/UMCG research database](#)

Citation for published version (APA):

Guo, Q. (2021). *Understanding and control of the metallic state in epitaxial NdNiO₃*. [Thesis fully internal (DIV), University of Groningen]. University of Groningen. <https://doi.org/10.33612/diss.180302851>

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Propositions

accompanying the dissertation

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Qikai Guo

1. Electrical characterization is seemingly simple but extracting from those data systematic, robust behavior that describes the intrinsic mechanisms of electron scattering is very challenging.
2. A tiny difference in the radius of rare-earth atoms can induce a huge change in the metal-insulator transition temperature of rare-earth nickelates.
3. Epitaxial growth is a flexible method to modulate the structure and properties of nickelates.
4. An in-depth analysis of the degree of disorder is required before assigning a material as Fermi liquid or non-Fermi liquid based on the resistivity-temperature exponent (*Chapter 4*).
5. Controlling the oxygen content is a useful way to systematically alter the resistivity of rare-earth nickelates (*Chapter 5*).
6. “Bad” usually means inferior. Nevertheless researchers are interested in “bad metals” (*Chapter 6*).
7. The best way to find a common feature of various materials is putting them together (*Chapter 6*).
8. Discussion with others is an effective way to promote our understanding of research.
9. We cannot predict the future but, as researchers, we should always know what we need to do tomorrow.