# Article information:

Up-conversion emission in transition metal and lanthanide co-doped systems: dimer sensitization revisited | Scientific Reports  
<https://www.nature.com/articles/s41598-023-28583-3>

# Article summary:

1. Co-doping lanthanide (Ln) based nanoparticles with transition metals (TM) is used to create upconversion (UC) systems with high quantum efficiency and modulated colour.

2. TM co-doping changes the nature of the UC mechanism, which is assumed to be a ground state absorption followed by excited-state absorption (GSA/ESA) in the TM-Yb pair followed by direct energy transfer to Er/Tm excited levels.

3. This article revisits this interpretation by considering two neglected issues using a different experimental approach, and examines the system previously investigated in Ref.9 as a case example.

# Article rating:

May be slightly imbalanced: The article presents the information in a generally reliable way, but there are minor points of consideration that could be explored further or claims that are not fully backed by appropriate evidence. Some perspectives may also be omitted, and you are encouraged to use the research topics section to explore the topic further.

# Article analysis:

This article provides an overview of the current understanding of upconversion emission in transition metal and lanthanide co-doped systems, and attempts to revisit this interpretation by considering two neglected issues using a different experimental approach. The article is well written and provides a comprehensive overview of the topic, including relevant background information and references to previous studies on the subject.

The authors provide evidence for their claims, such as citing previous studies that have demonstrated significant intensity enhancement paired with colour change and photon order modification of Ln UC emission in many hosts due to TM co-doping, as well as discussing theoretical models that explain the underlying mechanism of UC emission in these systems. However, there are some potential biases present in the article that should be noted. For example, while the authors discuss potential risks associated with heterovalent doping with low solubility metals such as Mn(2 +) or Mo(6 +), they do not provide any evidence for these risks or explore counterarguments that may refute them. Additionally, while they mention possible applications for these systems such as displays, lasers, photonics, bioimaging, solar cells thermometry, pH sensor etc., they do not provide any evidence or discussion regarding how effective these applications may be or what challenges may arise when attempting to use them in practice.

In conclusion, this article provides an informative overview of upconversion emission in transition metal and lanthanide co-doped systems and attempts to revisit existing interpretations by considering two neglected issues using a different experimental approach. While it does provide evidence for its claims and discusses potential risks associated with heterovalent doping with low solubility metals such as Mn(2 +) or Mo(6 +), it does not explore counterarguments that may refute these risks nor does it provide any evidence or discussion regarding how effective possible applications for these systems may be or what challenges may arise when attempting to use them in practice.

# Topics for further research:

* Heterovalent doping risks
* Challenges of using upconversion emission systems
* Applications of upconversion emission systems
* Counterarguments to heterovalent doping risks
* Effectiveness of upconversion emission applications
* Theoretical models of upconversion emission

# Report location:

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