# Article information:

Polymers | Free Full-Text | Carbon Nanotube-Based Intumescent Flame Retardants Achieve High-Efficiency Flame Retardancy and Simultaneously Avoid Mechanical Property Loss  
<https://www.mdpi.com/2073-4360/15/6/1406>

# Article summary:

1. Carbon nanotube-based intumescent flame retardants (CTAPP) can effectively enhance the flame retardant properties of natural rubber (NR) matrix and reduce negative impacts on mechanics caused by adding ammonium polyphosphate (APP) flame retardant.

2. The special structure of CTAPP, with tannic acid-modified carbon nanotubes wrapped on the surface of APP, can decrease peak heat release rate, total heat release, and total smoke production by 68.4%, 64.3%, and 49.3%, respectively, while increasing limiting oxygen index to 28.6%.

3. The high thermal conductivity of carbon nanotubes plays a crucial role in the flame retardant system, and CTAPP can effectively reduce mechanical damage caused by the flame retardant to the polymer.

# 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:

作为一篇科学研究论文，该文章在方法、实验和结果方面都有其可靠性和科学性。然而，在讨论和结论部分，作者可能存在一些偏见和不足之处。

首先，作者没有充分探讨使用碳纳米管（CNTs）的潜在风险。虽然CNTs具有高导热性能，但它们也被认为是一种潜在的危险物质，可能对人体健康造成损害。因此，在使用CNTs时需要更加谨慎，并进行充分的安全评估。

其次，作者没有提供关于其他材料或化合物的比较数据。虽然该文章中提到了与未添加任何阻燃剂的天然橡胶相比的结果，但缺乏与其他阻燃剂或阻燃剂组合材料进行比较的数据。这使得读者难以确定该新型阻燃剂是否是最佳选择。

此外，在讨论中，作者没有充分考虑到环境影响问题。虽然该新型阻燃剂可以有效地减少火灾发生的风险，但它是否会对环境产生负面影响仍需进一步评估。

最后，在结论中，作者声称他们所提出的新型阻燃剂可以同时实现高效防火和避免机械性能损失。然而，他们并没有提供足够的证据来支持这个主张。因此，在未来的工作中需要更多地探索这个问题，并提供更多可靠的数据来支持这个主张。

总之，尽管该文章在方法、实验和结果方面具有可靠性和科学性，但在讨论和结论部分存在一些偏见和不足之处。未来需要更多地探索这些问题，并提供更多可靠的数据来支持相关主张。

# Topics for further research:

* Potential risks of using carbon nanotubes (CNTs)
* Comparison with other flame retardants or flame retardant composite materials
* Environmental impact of the new flame retardant
* Lack of evidence to support the claim of maintaining mechanical properties while achieving high flame retardancy
* Need for further safety evaluation when using CNTs
* Importance of providing more reliable data to support claims in the discussion and conclusion sections.

# Report location:

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