cbecimat26
26° Congresso Brasileiro de Engenharia e Ciência dos Materiais
22 a 26 de novembro de 2026
Costão do Santinho
Florianópolis-SC

# Desenvolvimento e caracterização de nanopartículas verdes de óxido de bismuto para aplicação na degradação do fármaco sulfadiazina sob radiação visível

Daniel Moro Druzian[1]; Yolice Patricia Moreno Ruiz[2]; Giovani Pavoski[3]; Jorge Alberto Soares Tenório[3]; Denise Crocce Romano Espinosa[3]; Cátia Alexandra Leça Graça[4]; William Leonardo da Silva[1]

[1]Grupo de Pesquisa em Nanomateriais Aplicados (GPNAp), UFN, Santa Maria-RS, Brasil

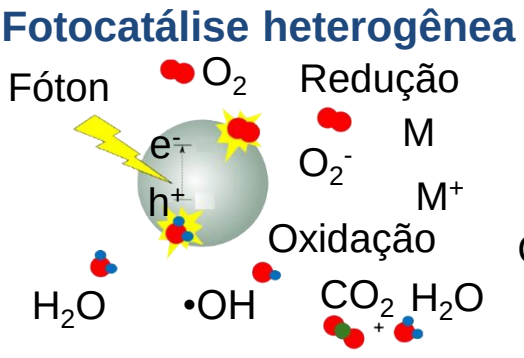
[2]Centro de Tecnologias Estratégicas do Nordeste (CETENE), Recife-PE, Brasil

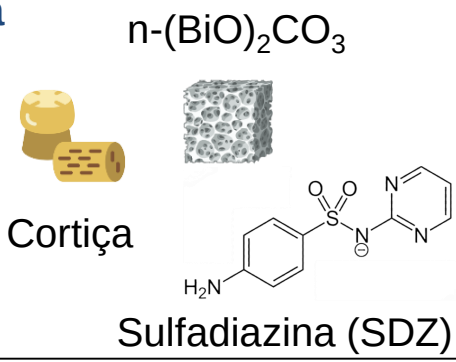
[3]Laboratório de Reciclagem, Tratamento de Resíduos e Extração (LAREX), USP, São Paulo-SP, Brasil

[4]LSRE-LCM, ALiCE, Faculty of Engineering, University of Porto, Portugal

## Introdução (Sadiq *et al.*, 2025)

### Fotocatálise heterogênea



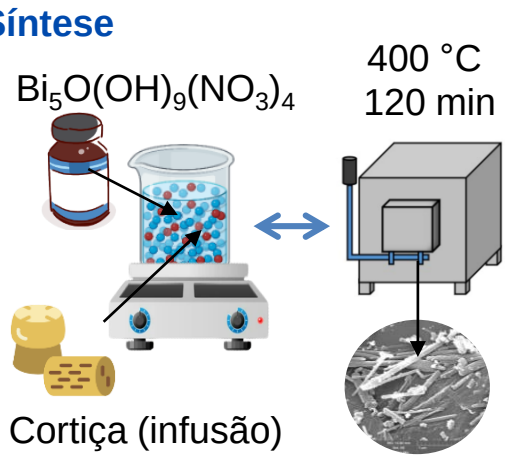




## Objetivos

Desenvolver e caracterizar nanopartículas verdes de **subcarbonato de bismuto** (n-$(BiO)_2CO_3$) a partir do extrato aquoso do resíduo de **cortiça natural** (*Quercus suber* L.), para potencial aplicação na **fotodegradação** da **SDZ** sob radiação visível.

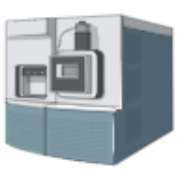
## Metodologia / Resultados e Discussão (Graça; Soares, 2024)

### Síntese




### Caracterização

DRX



Porosimetria $N_2$



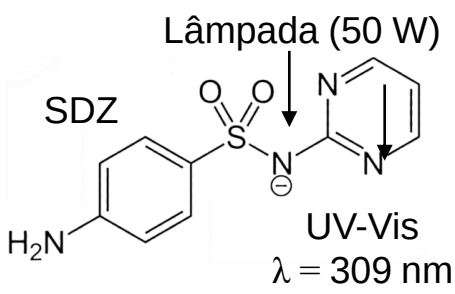
MEV-FEG



FTIR-ATR

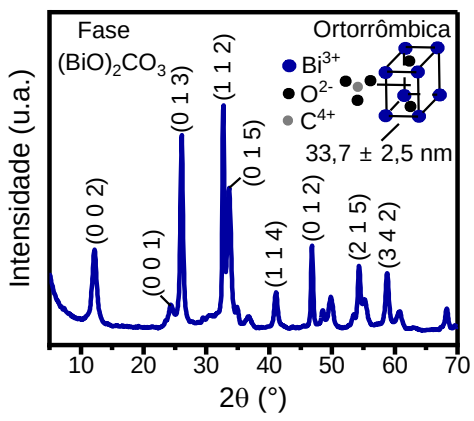


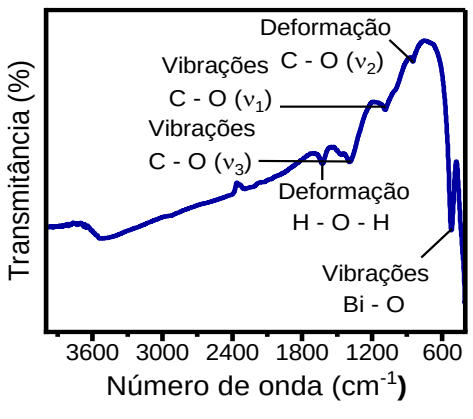
### Fotocatálise heterogênea

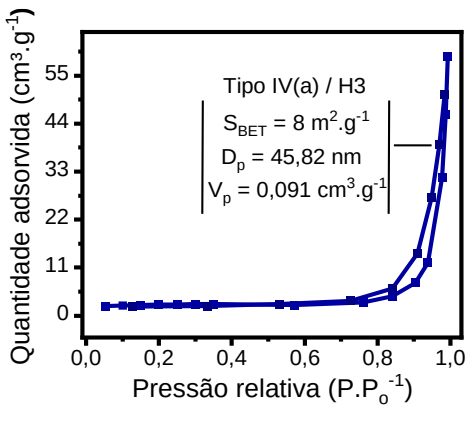



Planejamento experimental
Cinética
Reuso
Mecanismo
*Machine learning*
Ensaios *in silico*

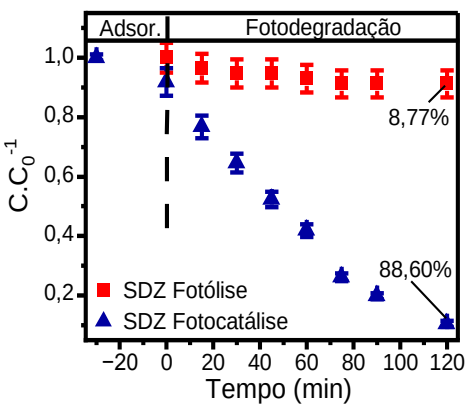
### Caracterização

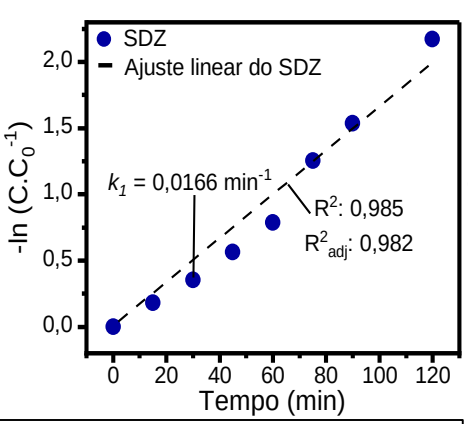


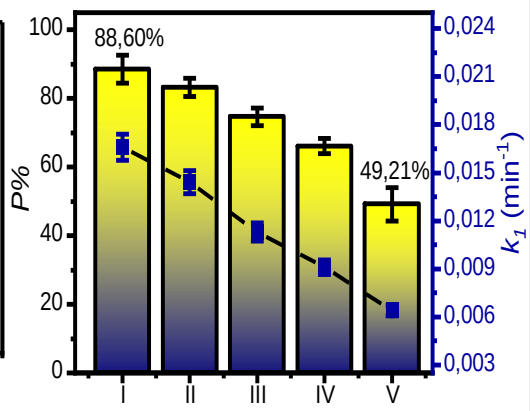



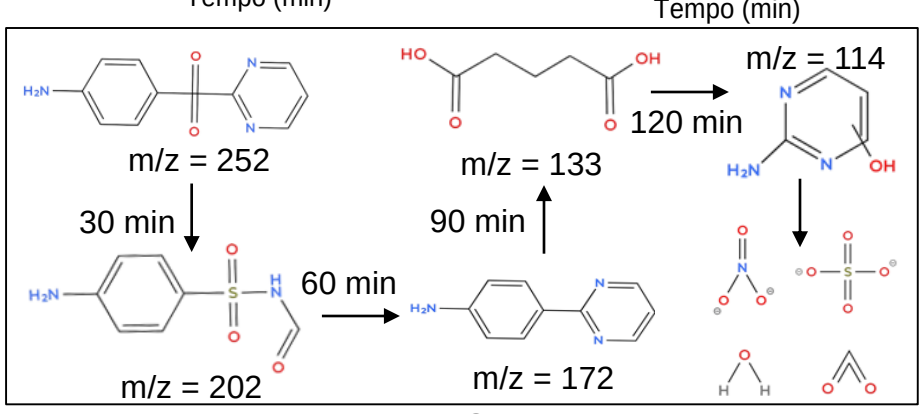



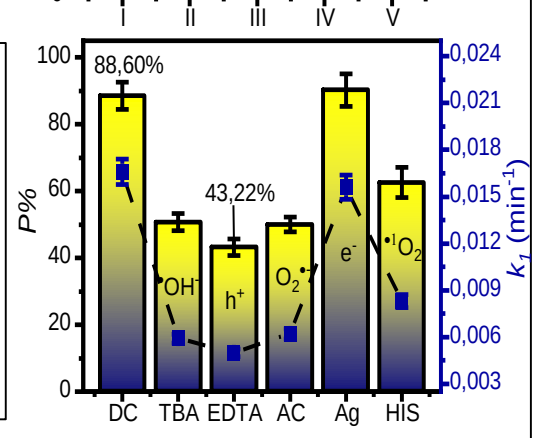

### Atividade Fotocatalítica

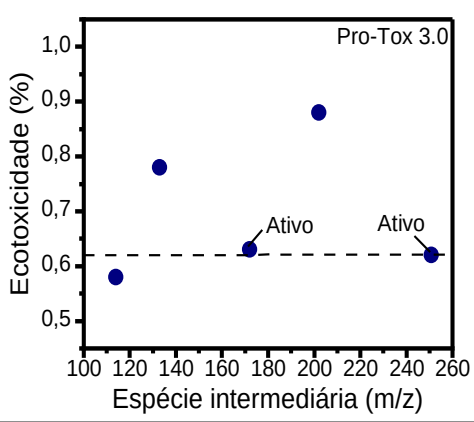


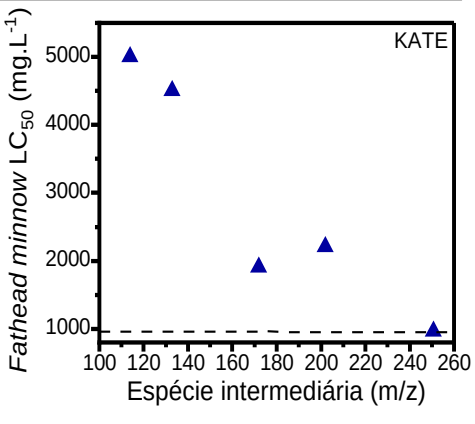



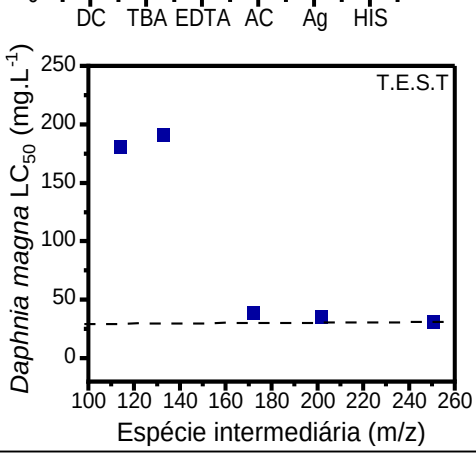




## Conclusões

- Fase ortorrômbica **$(BiO)_2CO_3$**;
- Fotodegradação de **71,4% do SDZ** após 120 minutos (***k* = 0,0166 $min^{-1}$**);
- Mecanismo do **tipo I (radical)** / (**$h^+$ e $OH^-$**);
- **Estabilidade limitada** (redução de 44%);
- Tendência de **redução da toxicidade** sistêmica.

## Referências

- SADIQ, F.Q. *et al.* Sustainable remediation of persistent organic Pollutants: A review on Recent innovative technologies. **Current Research in Biotechnology**, v. 9, p. 100293–100309, 2025. https://doi.org/10.1016/j.crbiot.2025.100293
- GRAÇA, C.A.L.; SOARES, O.S.G.P. From Waste to Resource: Evaluating Biomass Residues as Ozone-Catalyst Precursors for the Removal of Recalcitrant Water Pollutants. **Environments**, v. 11, p. 172–181, 2024. https://doi.org/10.3390/environments11080172

## Agradecimentos

UFN Universidade Franciscana
FAPERGS
CETENE
LAREX
UFN.TEC
GPNAp
@GPNAP_