cbecimat26
26° Congresso Brasileiro de Engenharia e Ciência dos Materiais
November 22–26 2026
Costão do Santinho Florianópolis-SC
univap UNIVERSIDADE DO VALE DO PARAÍBA

Reuse of WC-Co Grinding Sludge: Effect of the Milling Medium on Paste Preparation for 3D Printing by Robocasting

Luan Mateus Chagas[1], José Augusto Mello dos Santos[1], Suzilene R. Janasi[2], Fabio Miranda[2,3], Daniel Rodrigues[2], Fernando S. Ortega[1]

[1] Univap, IP&D, São José dos Campos, SP [2] BRATS Filtros Sinterizados, Cajamar, SP
[3] IPEN, CECTM, São Paulo, SP, Brazil Contact: ortega@univap.br

Introduction

Contaminants and batch variability hinder dispersion and the preparation of pastes for robocasting [1–3].

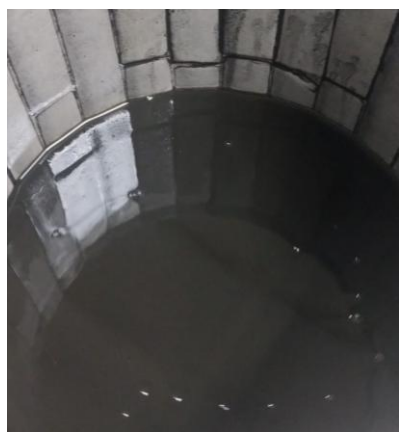


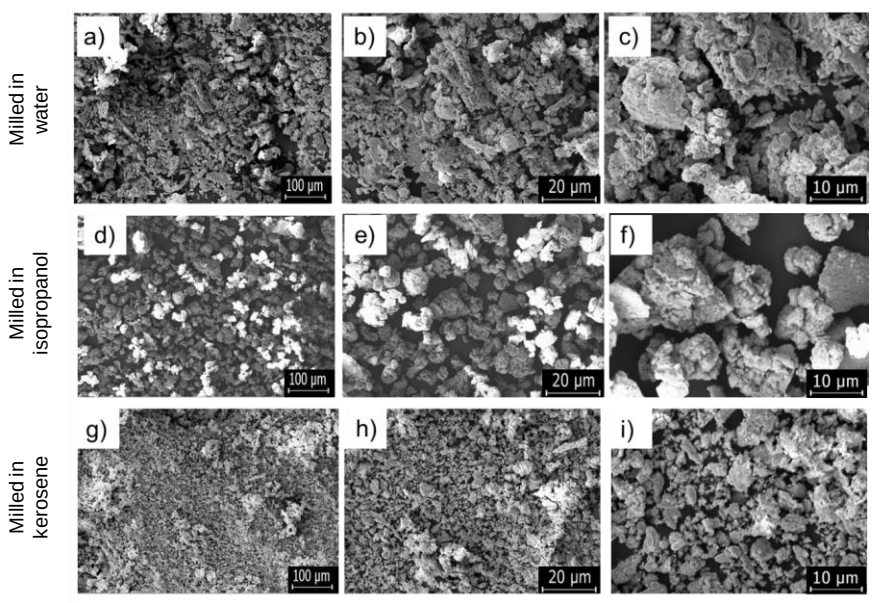
Objective: Assess the effect of the liquid medium on milling, WC-Co sludge processability and paste preparation for 3D printing.

Methods

- Comparison of liquid milling media:
  - ✓ water, isopropanol, kerosene.
- Filtration, drying and sieving. Characterization: SEM, FTIR and TGA.
- Printing with an aqueous PEG 8000 solution.

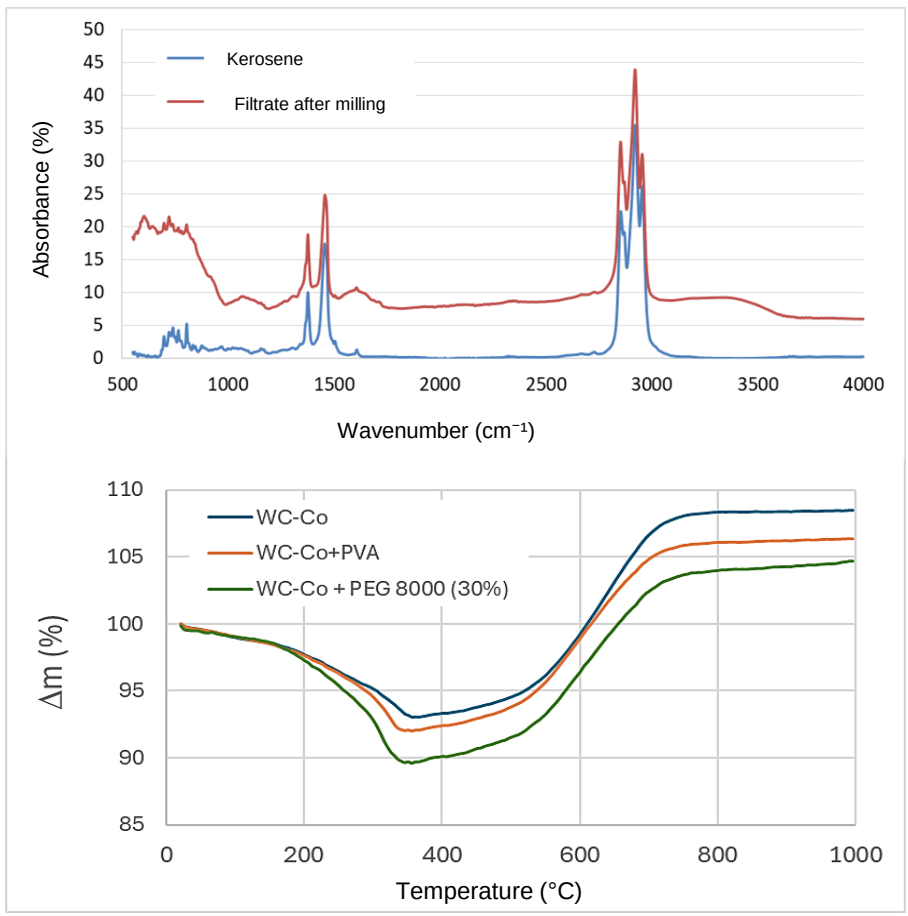






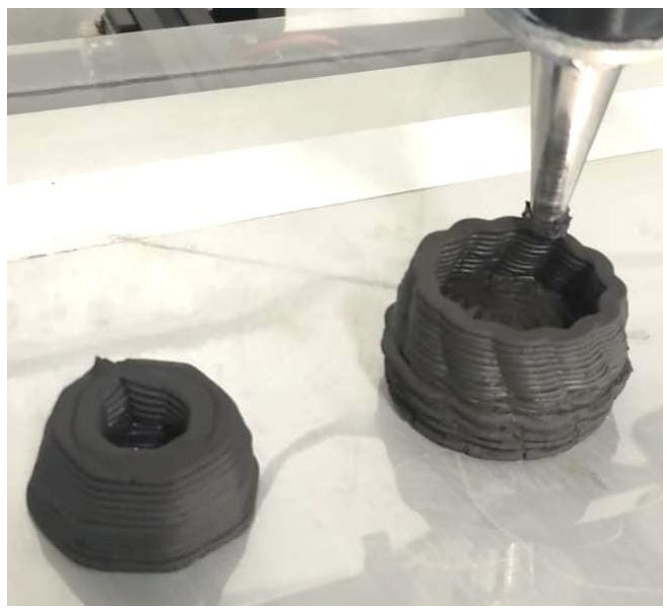
Milling medium: water (a–c), isopropanol (d–f) and kerosene (g–i). Kerosene improved powder dispersion and homogeneity.

Results and discussion



(a) FTIR: kerosene and filtrate after milling, (b) TGA.

- Differences between the solvent and the filtrate are consistent with compounds extracted from the sludge.
- Hydrocarbon bands alone do not prove extraction, as they are also present in kerosene.



Part printed with kerosene-milled sludge paste: 12% aqueous PEG 8000 solution (12%).

Conclusions

Kerosene improved second-batch processing. PEG 8000 enabled printing without exudation and excellent green strength, assessed qualitatively.

References

[1] PACINI, A. et al. Direct recycling of WC-Co grinding chip. Materials, v. 16, n. 4, art. 1347, 2023.
[2] LAMNINI, S. et al. Robocasting of advanced ceramics: ink optimization and protocol to predict the printing parameters-A review. Heliyon, v. 8, n. 9, 2022.
[3] LEWIS, J. A. Direct ink writing of 3D functional materials. Advanced Functional Materials, v. 16, p. 2193–2204, 2006.

Acknowledgments

BRATS FILTROS SINTERIZADOS PÓS METÁLICOS ESPECIAIS
FAPESP FUNDAÇÃO DE AMPARO À PESQUISA DO ESTADO DE SÃO PAULO
Grant Nos.: 2019/08927-2, 2022/06201-7
CNPq Conselho Nacional de Desenvolvimento Científico e Tecnológico
Grant Nos.: 441780/2024-5, 350440/2025-5, 350485/2025-9.