

Supporting Information

Enhancing Cassava Starch Bioplastics with *Vismia guianensis* Alcoholic Extract: Characterization with Potential Applications

Josiel F. Santos ¹, Crystian Willian C. Silva ², Barbara P. G. Silva ²,
Pedro H. Britto-Costa ³, Cleidilane S. Costa ⁴, Larissa Otubo ², ArturW.
Carbonari ^{2,*} and Gabriel A. Cabrera-Pasca ^{3,4,*}

1 Programa de Pos-Graduacao em Ciencia e Engenharia de Materiais—PPGCEM, Universidade Federal do Para (UFPA), Ananindeua 67130-660, PA, Brazil

2 Instituto de Pesquisas Energeticas e Nucleares, Comissao Nacional de Energia Nuclear, IPEN-CNEN/SP, Sao Paulo 05508-000, SP, Brazil

3 Research Center for Gas Innovation, Escola Politecnica, Universidade de Sao Paulo, Sao Paulo 05508-030, SP, Brazil

4 Faculdade de Ciencias Exatas e Tecnologia, Universidade Federal do Para (UFPA), Abaetetuba 684440-000, PA, Brazil

* Correspondence: carbonar@ipen.br (A.W.C.); gpasca@ufpa.br (G.A.C.-P.)

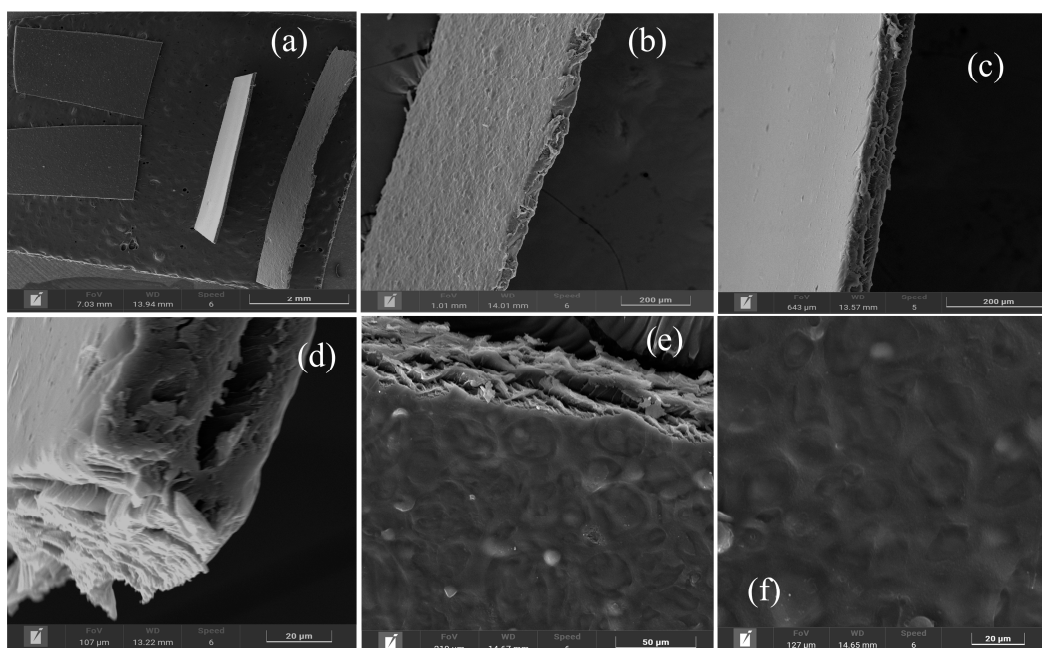


Figure S1. SEM images corresponding to the starch sample containing 0.5% of *Vismia guianensis* alcoholic extract in different configurations and magnifications. (a) Samples mounted on stubs for SEM characterization. (b-d) Cross-section. (e-f) Film surface.

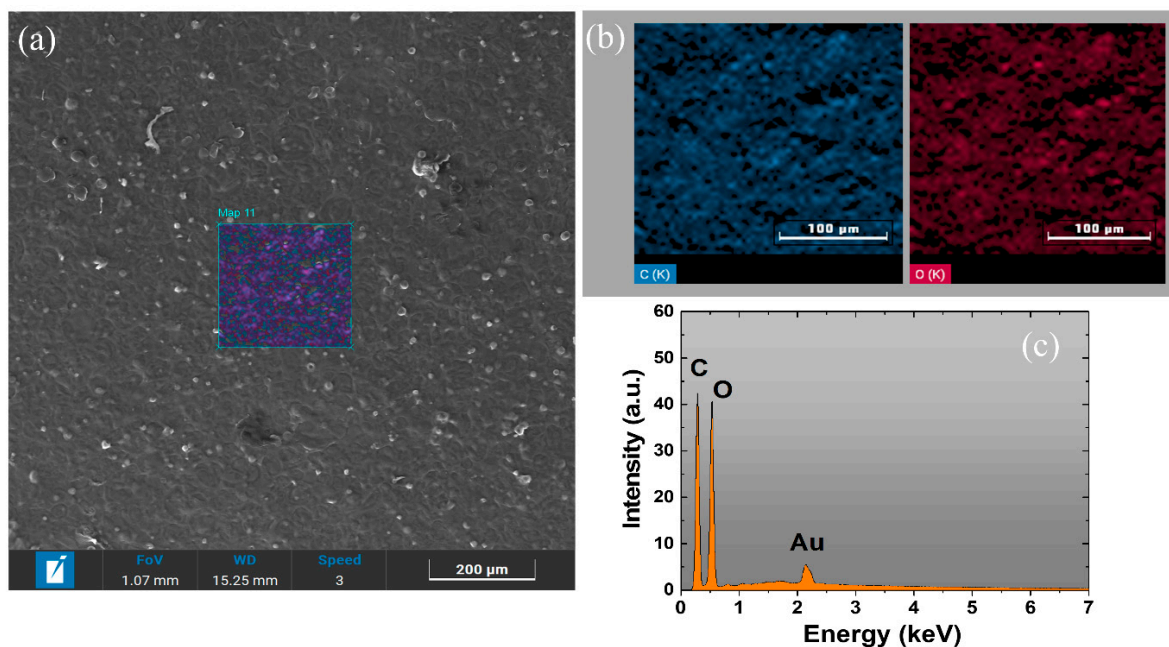


Figure S2. Microscopic and elemental characterization of the starch sample containing 0.5% of *Vismia guianensis* alcoholic extract. (a) SEM-EDS micrograph in Mapping mode. (b) Composition maps. (c) EDS spectrum.

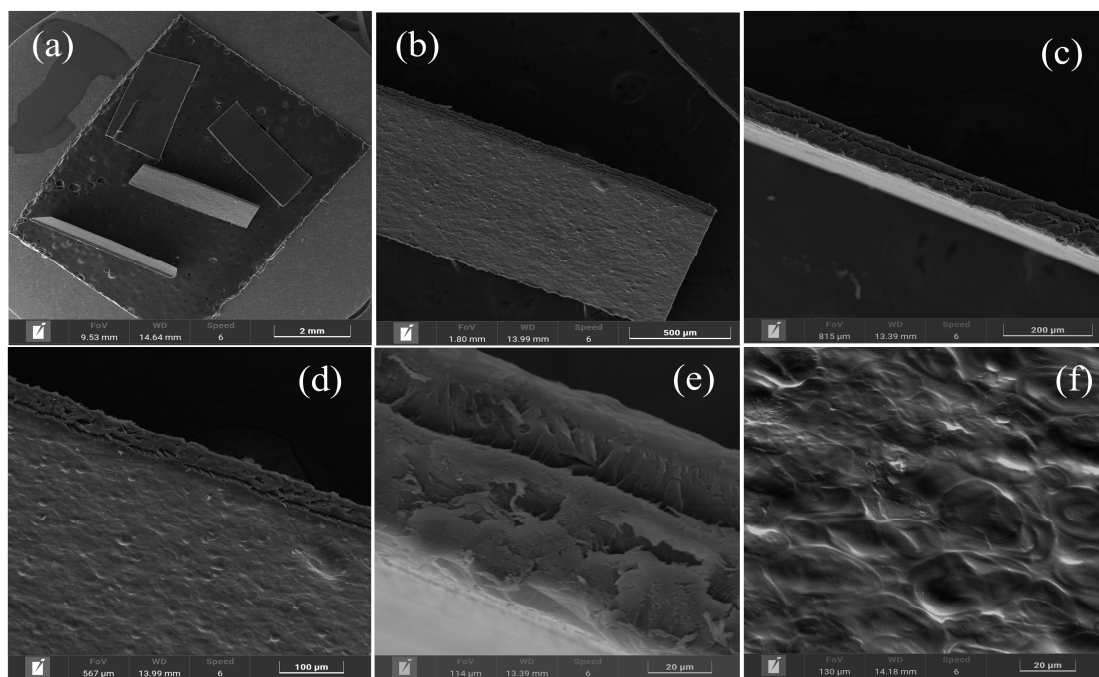


Figure S3. SEM images corresponding to the starch sample containing 1% of *Vismia guianensis* alcoholic extract in different configurations and magnifications. (a) Samples mounted on stubs for SEM characterization. (b-e) Cross-section. (f) Film surface.

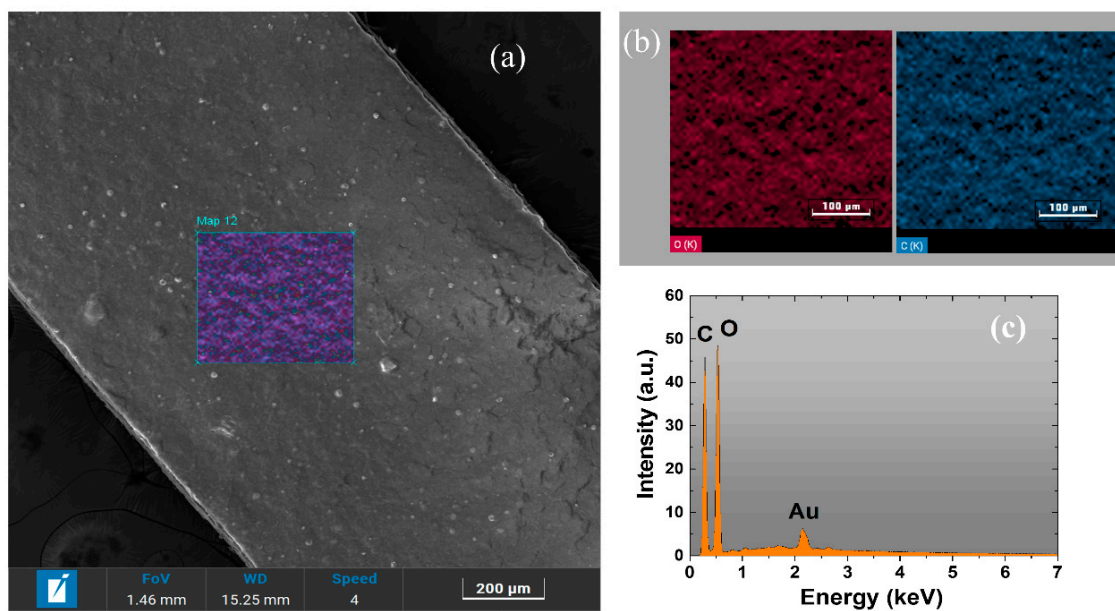


Figure S4. Microscopic and elemental characterization of the starch sample containing 1% of *Vismia guianensis* alcoholic extract. (a) SEM-EDS micrograph in Mapping mode. (b) Composition maps. (c) EDS spectrum.

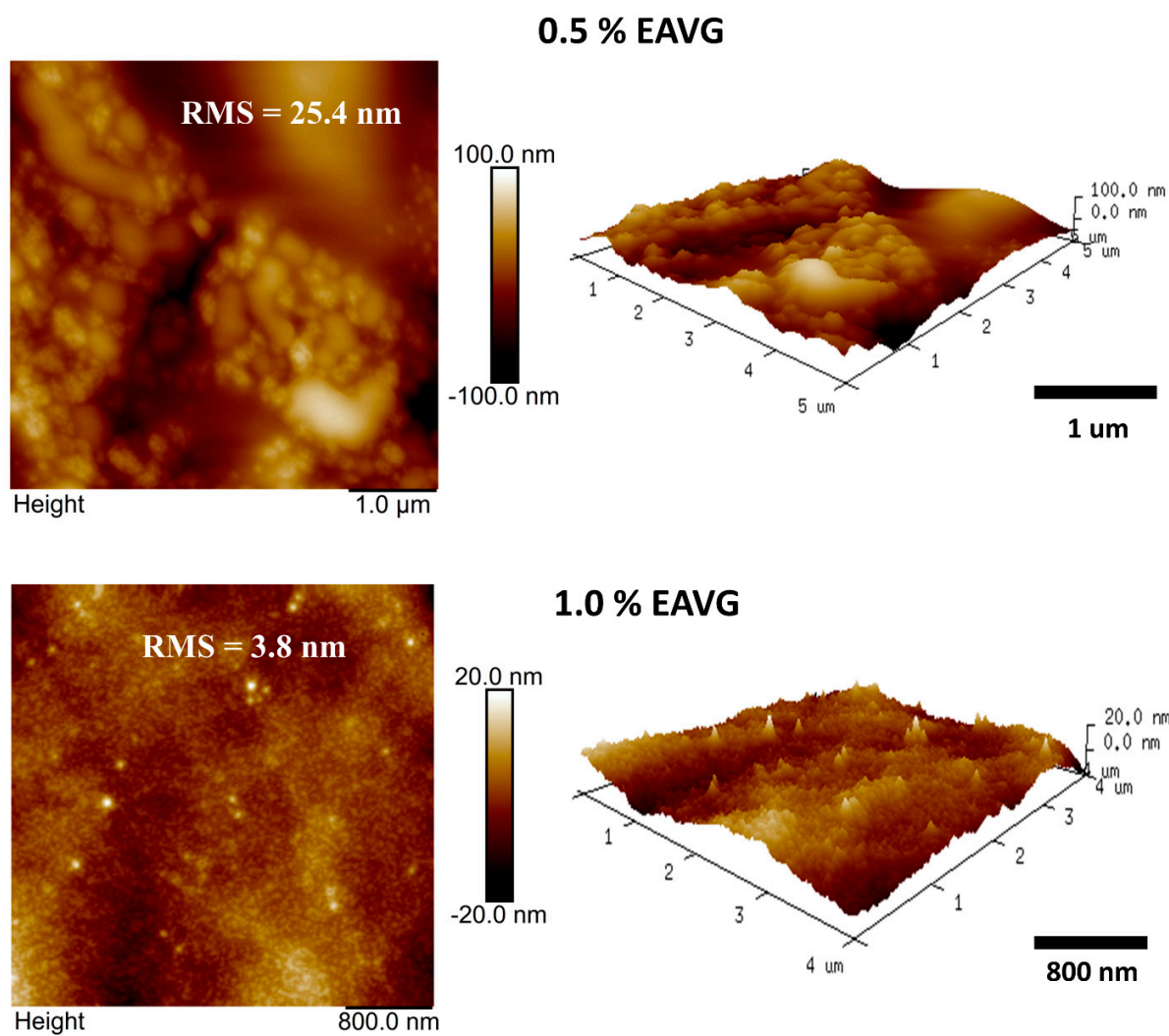


Figure S5. 3D AFM images for 0.5% (top) and 1.0% (bottom) of *Vismia guianensis* alcoholic extract bioplastic films showing the surface roughness and their respective cross section analysis.