Centro UC
Investigación en Nanotecnología
y Materiales Avanzados - CIEN

Microscopía Electrónica de Barrido (FESEM) – EDS

Microscopio Electrónico FEI QUANTA FEG 250

Descripción

El microscopio marca FEI (actualmente Thermofisher), modelo Quanta FEG 250 es un microscopio electrónico de barrido con cátodo de emisión de campo (FESEM) de alta resolución. Este tiene incorporado un detector detector de rayos X de energía dispersiva (EDS), SSD modelo Octane Pro, para obtener información de composición elemental de la superficie de la muestra. El FEI Quanta FEG 250 es capaz de ofrecer información morfológica y de composición elemental de la superficie de la muestra con una mayor resolución y un mayor rango de energía que un SEM convencional.

El FEI Quanta FEG 250 está equipado con un cañón de emisión de campo Schottky y un detector Everhart-thornley para la detección de electrones secundarios, lo cual permite una resolución máxima de pocos nanómetros. Cuenta con 3 modos de operación, alto vacío, bajo vacío y modo de vacío extendido, lo que permite analizar muestras húmedas y de baja conductividad eléctrica.

Académico a cargo: Dr. Samuel Hevia – sheviaz@uc.cl
Encargado de Servicios: Dr. Álvaro Adrian – fesemcien@uc.cl - (569) 5504 1441
Av. Vicuña Mackenna 4860, Macul. Santiago – Chile. Código postal, 7820436

El detector EDS es un Silicon Drift Detector (SDD), modelo Octane Pro de 10 mm^2 de área de detección. Posee una Resolución de 130 eV y estabilidad de resolución sobre 90% hasta las 200 kcps.

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Aplicaciones

Micro y nano-caracterización de superficies. Estudio de fracturas, soldaduras, secciones pulidas, películas y revestimientos. Caracterización de micro y nano partículas, materiales porosos y fibras.

Análisis en metales y aleaciones. Materiales magnéticos y semiconductores. Cerámica, plásticos, secciones geológicas, minerales, polímeros, productos farmacéuticos, filtros, geles, tejidos y material animal o vegetal.

Áreas de estudio:

Ciencia de materiales, nanotecnología, microbiología, ingeniería mecánica, construcción, arqueología, geología, minería, farmacia, forense, ingeniería de alimentos, química de superficies y educación.

Especificaciones Técnicas

Voltaje de aceleración: 500 V to 30 kV
Magnificación: de 14 X a 1.000.000 X
Ancho horizontal máximo de campo: 8,8 mm

Desplazamiento de la plataforma motorizada: X-Y 50 mm, Z: 50 mm.
Inclinación (T): - 15° to + 75°.
Radial: 360°.

3 modos de operación: Alto vacío (< 6 x 10^{-4} Pa), bajo vacío (10 a 130 Pa) y vacío ESEM (10 a 4000 Pa).

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Resolución del haz de electrones:

Alto Vacío

- 0,8 nm at 30 kV (STEM)
- 1,0 nm at 30 kV (SE)
- 2,5 nm at 30 kV (BSE)
- 3 nm at 1 kV (SE)

Bajo Vacío

- 1,4 nm at 30 kV (SE)
- 2,5 nm at 30 kV (BSE)
- 3,0 nm at 3 kV (SE)

Modo de vacío extendido (ESEM)

- 1,4 nm at 30 kV (SE)

Servicios

- Microscopía FESEM: Electrones secundarios, electrones retrodispersados, microscopia de transmisión STEM.
- Espectroscopia de Rayos X (EDX). Espectroscopia convencional EDS y Mapeo de composición (imagen de composición elemental).

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Publicaciones

1. Díaz-Rosas, F., et al. (2021). Abundances and morphotypes of the coccolithophore Emiliania huxleyi in southern Patagonia compared to neighbouring oceans and Northern Hemisphere fjords. *Biogeosciences*, *18*(19), 5465–5489. https://doi.org/10.5194/bg-18-5465-2021
2. Guerra, et al. (2021). Corrosion analysis of AISI 430 stainless steel in the presence of Escherichia coli and Staphylococcus aureus. *Corrosion Science*, *181*(May 2020). https://doi.org/10.1016/j.corsci.2020.109204
3. Brescia-Norambuena, L., et al. (2021). Improving concrete underground mining pavements performance through the synergic effect of silica fume, nanosilica, and polypropylene fibers. *Construction and Building Materials*, *285*. https://doi.org/10.1016/j.conbuildmat.2021.122895
4. Alegría, M., et al. (2021). Layered Nanocomposite 2D-TiO2 with Cu2O Nanoparticles as an Efficient Photocatalyst for 4-Chlorophenol Degradation and Hydrogen Evolution. *Topics in Catalysis*, *64*(1–2). https://doi.org/10.1007/s11244-020-01360-6
5. Molina, M. T., et al. (2021). Rotary-moulded biscuits: Dough expansion, microstructure and sweetness perception as affected by sucrose:flour ratio and sucrose particle size. *Food Structure*, *29*. https://doi.org/10.1016/j.foostr.2021.100199
6. Cortinez, D., et al. (2020). A multifunctional bi-phasic graphene oxide/chitosan paper for water treatment. *Separation and Purification Technology*, *235*(November 2018), 116181. https://doi.org/10.1016/j.seppur.2019.116181
7. Yagui, J., et al. (2020). Benzodithiophene-based small molecules for vacuum-processed organic photovoltaic devices. *Optical Materials*, *109*. https://doi.org/10.1016/j.optmat.2020.110354
8. González-Henríquez, C. M., et al. (2020). Biocompatible fluorinated wrinkled hydrogel films with antimicrobial activity. *Materials Science and Engineering C*, *114*(April), 111031. https://doi.org/10.1016/j.msec.2020.111031
9. Gonzalez-Calderon, H., et al. (2020). Biopolymer-waste fiber reinforcement for earthen materials: Capillary, mechanical, impact, and abrasion performance. *Polymers*, *12*(8). https://doi.org/10.3390/polym12081819
10. Olate-Moya, F., el al. (2020). Chondroinductive Alginate-Based Hydrogels Having Graphene Oxide for 3D Printed Scaffold Fabrication. *ACS Applied Materials and Interfaces*, *12*(4). https://doi.org/10.1021/acsami.9b22062
11. Rojas-Romo, C., et al. (2020). Determination of molybdenum(VI) via adsorptive stripping voltammetry using an ex–situ bismuth screen–printed carbon electrode. *Microchemical Journal*, *154*. https://doi.org/10.1016/j.microc.2019.104589
12. Bonardd, S., Morales, et al. (2020). Doped Poly(3-hexylthiophene) Coatings onto Chitosan: A Novel Approach for Developing a Bio-Based Flexible Electronic. *ACS Applied Materials and Interfaces*, *12*(11). https://doi.org/10.1021/acsami.9b21289
13. Angulo-Pineda, C., et al. (2020). Electroactive 3D printed scaffolds based on percolated composites of polycaprolactone with thermally reduced graphene oxide for antibacterial and tissue engineering applications. *Nanomaterials*, *10*(3), 9–13. https://doi.org/10.3390/nano10030428
14. Lascano, S., et al. (2020). Graphene-coated Ti-Nb-Ta-Mn foams: A promising approach towards a suitable biomaterial for bone replacement. *Surface and Coatings Technology*, *401*(August), 126250. https://doi.org/10.1016/j.surfcoat.2020.126250
15. Maruthupandy, M., et al. (2020). Highly efficient multifunctional graphene/chitosan/magnetite nanocomposites for photocatalytic degradation of important dye molecules. *International Journal of Biological Macromolecules*, *153*, 736–746. https://doi.org/10.1016/j.ijbiomac.2020.03.045
16. Navarrete, I., et al. (2020). Impact of physical and physicochemical properties of supplementary cementitious materials on structural build-up of cement-based pastes. *Cement and Concrete Research*, *130*. https://doi.org/10.1016/j.cemconres.2020.105994
17. Blanco, E., et al. (2020). Insights in supported rhenium carbide catalysts for hydroconversion of lignin-derived compounds. *Applied Catalysis A: General*, *599*(February), 117600. https://doi.org/10.1016/j.apcata.2020.117600

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18. Castillo-Rodriguez, J., et al. (2020). Seed layer effect on morphological, structural, and optical properties of electrochemically grown ZnO nanowires over different SnO2:F/glass substrates. *Journal of Solid State Electrochemistry*, *24*(4). https://doi.org/10.1007/s10008-020-04527-z
19. Vilchez, F., et al. (2020). The effect of laser surface melting of stainless steel grade AISI 316L welded joint on its corrosion performance in molten Solar Salt. *Solar Energy Materials and Solar Cells*, *213*(April), 110576. https://doi.org/10.1016/j.solmat.2020.110576
20. Vilchez, F., et al. (2020). The effect of laser surface melting of stainless steel grade AISI 316L welded joint on its corrosion performance in molten Solar Salt. *Solar Energy Materials and Solar Cells*, *213*(April), 110576. https://doi.org/10.1016/j.solmat.2020.110576
21. Silva, D., et al. (2020). The effect of Staphylococcus aureus on the electrochemical behavior of porous Ti-6Al-4V alloy. *Bioelectrochemistry*, *136*. https://doi.org/10.1016/j.bioelechem.2020.107622
22. Sepúlveda, J., et al. (2020). Thermo-mechanical behavior of a granodiorite from the Liquiñe fractured geothermal system (39°S) in the Southern Volcanic Zone of the Andes. *Geothermics*, *87*. https://doi.org/10.1016/j.geothermics.2020.101828
23. Araya-Letelier, G., et al. (2020). Waste-based natural fiber reinforcement of adobe mixtures: Physical, mechanical, damage and durability performance assessment. *Journal of Cleaner Production*, *273*. https://doi.org/10.1016/j.jclepro.2020.122806
24. Campos, C., et al. (2019). About the relevance of particle shape and graphene oxide on the behavior of direct absorption solar collectors using metal based nanofluids under different radiation intensities. *Energy Conversion and Management*, *181*(December 2018), 247–257. https://doi.org/10.1016/j.enconman.2018.12.007
25. Navas, D., et al. (2019). Ammonium hexadeca-oxo-heptavanadate microsquares. A new member in the family of the V7O16 mixed-valence nanostructures. *New Journal of Chemistry*, *43*(45), 17548–17556. https://doi.org/10.1039/c9nj02188d
26. Retamoso, C., et al. (2019). Effect of particle size on the photocatalytic activity of modified rutile sand (TiO 2)for the discoloration of methylene blue in water. *Journal of Photochemistry and Photobiology A: Chemistry*, *378*(December 2018), 136–141. https://doi.org/10.1016/j.jphotochem.2019.04.021
27. González-Henríquez, C. M., et al. (2019). Formation of responsive hierarchical wrinkled patterns on hydrogel films via multi-step methodology. *Polymer*, *179*. https://doi.org/10.1016/j.polymer.2019.121662
28. Segovia, M., et al. (2019). Heterostructured 2D ZnO hybrid nanocomposites sensitized with cubic Cu2O nanoparticles for sunlight photocatalysis. *Journal of Materials Science*, *54*(21), 13523–13536. https://doi.org/10.1007/s10853-019-03878-x
29. González-Henríquez, C. M., et al. (2019). Microwrinkled pH-sensitive hydrogel films and their role on the cell adhesion/proliferation. *Materials Science and Engineering C*, *103*(June), 109872. https://doi.org/10.1016/j.msec.2019.109872
30. Durán, B., et al. (2019). Novel 3D copper nanoparticles/chitosan/nanoporous alumina (CCSA) membranes with catalytic activity. Characterization and performance in the reduction of methylene blue. *Journal of Cleaner Production*, *210*, 811–820. https://doi.org/10.1016/j.jclepro.2018.11.020
31. Palza, H., et al. (2019). Novel magnetic CoFe2O4/layered double hydroxide nanocomposites for recoverable anionic adsorbents for water treatment. *Applied Clay Science*, *183*(November), 105350. https://doi.org/10.1016/j.clay.2019.105350
32. Espinoza-González, R., et al. (2018). Effects of strontium/lanthanum co-doping on the dielectric properties of CaCu3Ti4O12 prepared by reactive sintering. *Ceramics International*, *44*(13), 15588–15595. https://doi.org/10.1016/j.ceramint.2018.05.223
33. Landaeta, E., et al. (2018). Enhanced photostability of cuprous oxide by lignin films on glassy carbon electrodes in the transformation of carbon dioxide. *Green Chemistry*, *20*(10). https://doi.org/10.1039/c8gc00365c
34. Aguirre, J., et al. (2018). Multifactorial study of erosion–corrosion wear of a X65 steel by slurry of simulated copper tailing. *Tribology International*, *126*(April), 177–185. https://doi.org/10.1016/j.triboint.2018.04.029
35. Ghosh, B., et al. (2017). Enhanced dielectric properties of PVDF/CaCu3Ti4O12:Ag composite films. *Materials Chemistry and Physics*, *196*, 302–309. https://doi.org/10.1016/j.matchemphys.2017.05.009

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