XXXI Simposio Peruano de Fisica 2025

STRUCTURAL, VIBRATIONAL AND MAGNETIC PROPERTIES OF CNT's MODIFIED WITH AMINO GROUPS

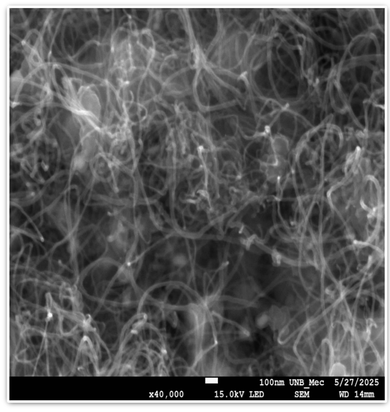
Luisa M. Huallpa Choqueanco[1]*; Wellington Marcos da Silva[1]; Marco A.R. Martinez[1]; Alexandre C. Dias[2];J.A.H. Coaquira[1]

1. Nanomaterial synthesis and magnetic characterization laboratory, Institute of Physics, Universidade de Brasília
2. Optical Laboratory, Institute of Physics, Universidade de Brasília

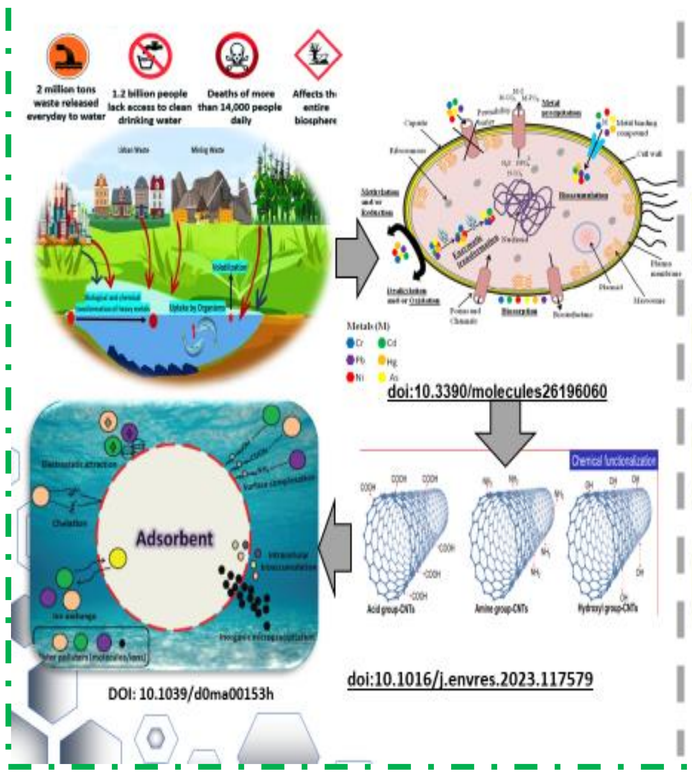
* Autor : huallpachoqueanco19@gmail.com

1. INTRODUCTION

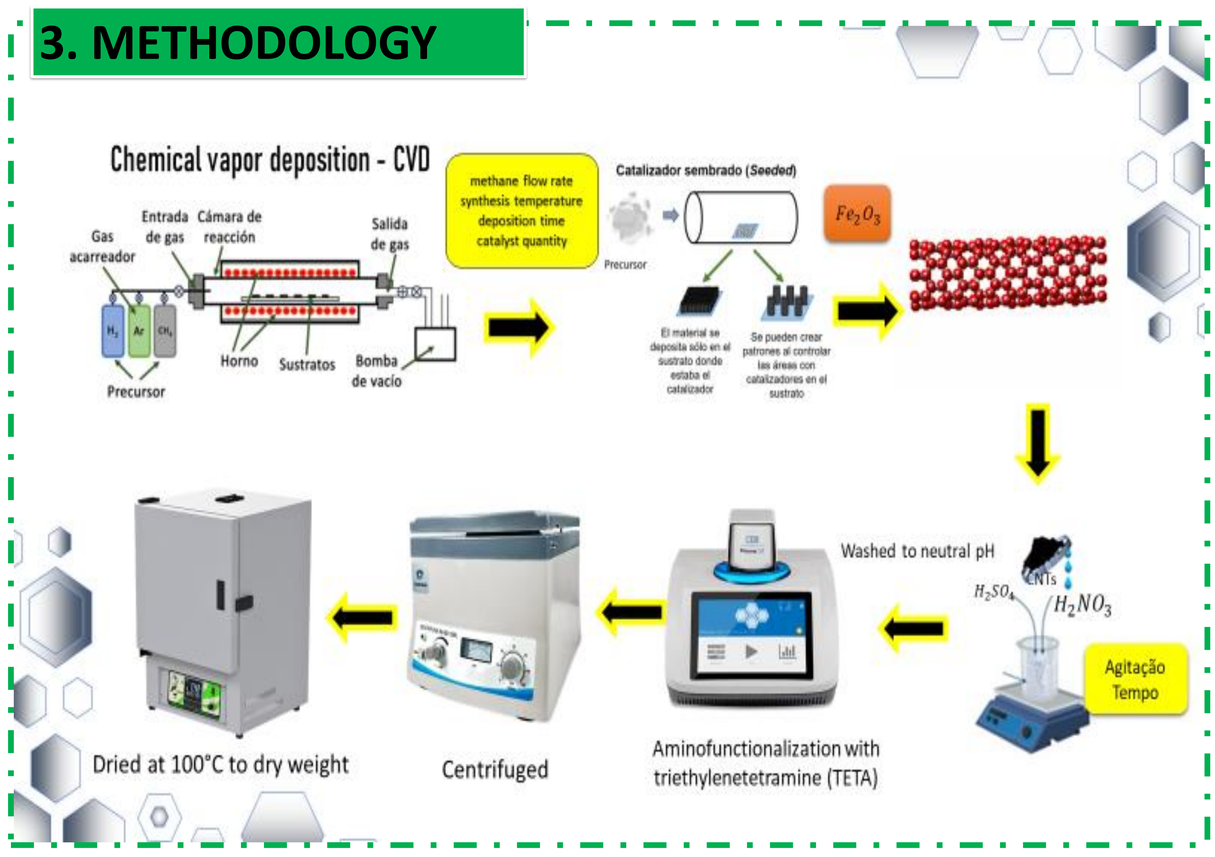
One of the most emerging trends for water decontamination is the application of nanomaterials because they demonstrate increased reactivity for adsorption, oxidation, reduction and catalysis of several contaminants. Some of the most common nanomaterials used for heavy metals treatment are carbon nanotubes (CNTs), due to their larger specific area, faster kinetics and higher reactivity than common adsorbents and can be easily regenerated and reused. In this work we present the synthesis and characterization of aminofunctionalized CNT's that will be used for water remediation.



2. MOTIVATION



3. METHODOLOGY



4. RESULTS AND DISCUSSION

4.1.-STRUCTURAL CHARACTERIZATION

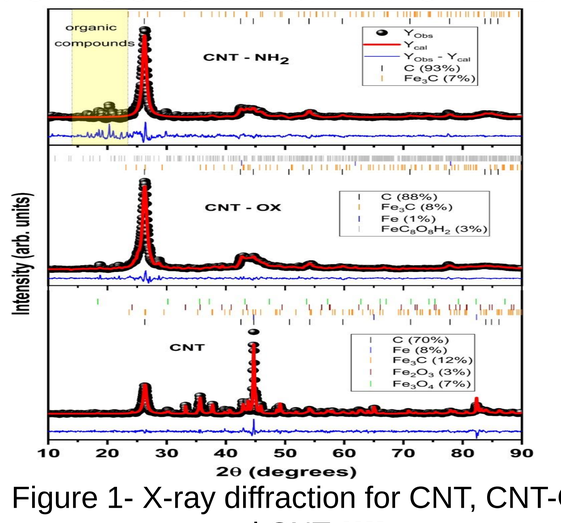


Figure 1- X-ray diffraction for CNT, CNT-OX and CNT-NH_2.

4.2-VIBRATIONAL CHARACTERIZATION

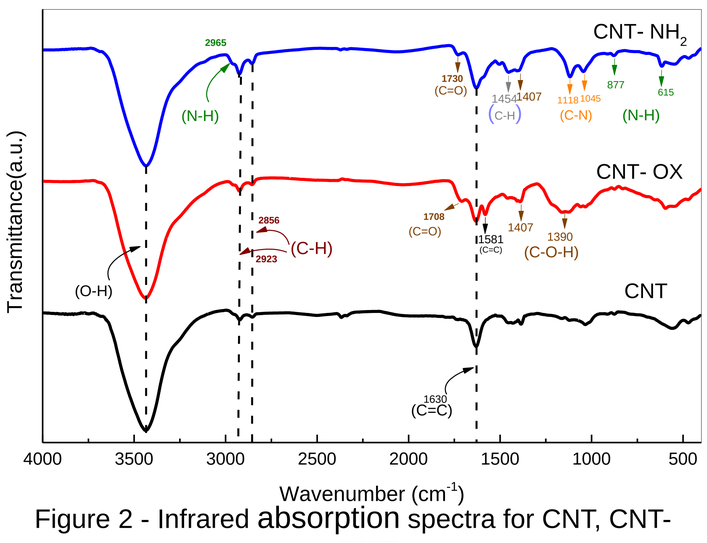


Figure 2 - Infrared absorption spectra for CNT, CNT-OX and CNT-NH_2.

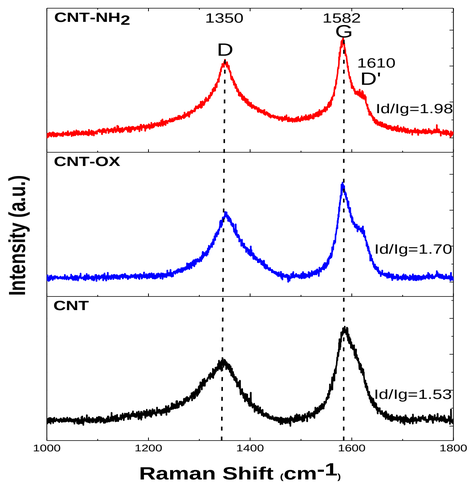


Figure 3 - Raman spectra for CNT, CNT-OX and CNT-NH_2. The 532 nm line of an Ar–Kr laser was used as the excitation source.

4.3-MAGNETIC CHARACTERIZATION

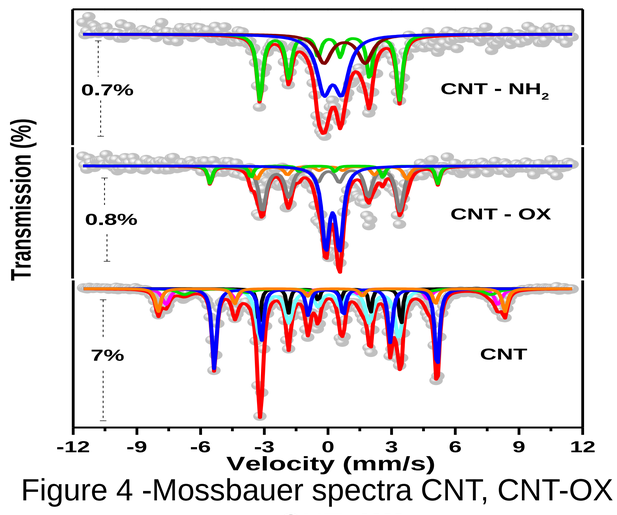


Figure 4 -Mossbauer spectra CNT, CNT-OX and CNT-NH_2

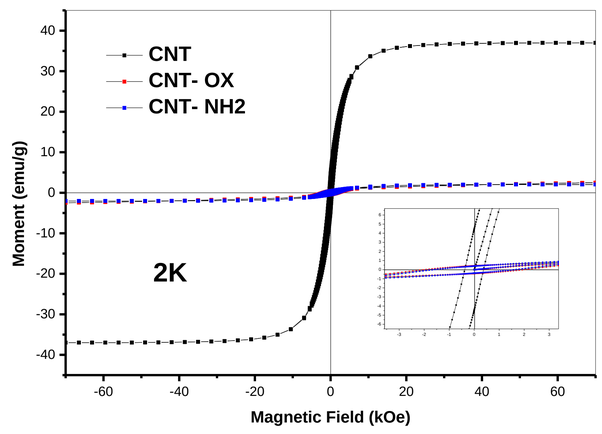


Figure 5 - Hysteresis loops obtained for the three samples at 2K.

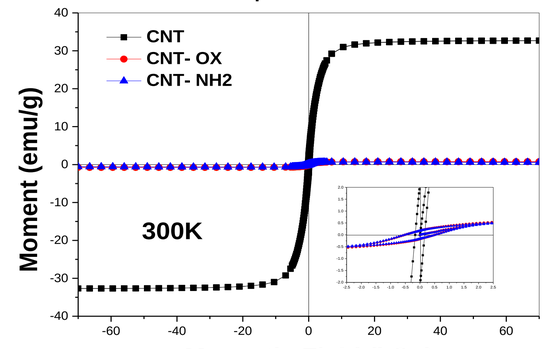


Figure 6 - Hysteresis loops obtained for the three samples at 300 k.

SAMPLE	Coercive Field Hc (oe)		Ms (emu/g)		Mr (emu/g)		Mr/Ms (emu/g)	
	2K	300K	2K	300K	2K	300K	2K	300K
CNT	392,02	161,94	36,99	32,66	4,45	2,14	0,12	0,07
CNT-OX	1922,29	512,11	2,49	0,74	0,42	0,17	0,17	0,23
CNT-NH2	1682,42	511,97	2,03	0,56	0,39	0,17	0,19	0,31

5. CONCLUSION

SEM images showed the formation of CNT's. XRD lines confirmed the presence of graphite with contributions associated with iron-rich phases. Mössbauer spectra revealed substantial changes in the electronic and magnetic environments of the iron. Vibrational characterization by FTIR successfully confirmed the introduction of functional groups. Raman spectra showed a controlled increase in structural disorder after functionalization. Magnetic measurements revealed dominant ferromagnetic behavior in pristine CNT's at 2 K, while oxidized and aminofunctionalized CNTs showed a predominantly paramagnetic response at both 2 K and 300 K, confirming the suppression of ferromagnetism induced by the chemical treatments.

6. REFERENCES

M. Kumar and Y. Ando, "*Chemical vapor deposition of carbon nanotubes: A review on growth mechanism and mass production*," J. Nanosci. Nanotechnol. **2010**, 10:3739.

Silva, W. M.; Ribeiro, H.; Seara, L. M.; Calado, H. D. R.; Ferlauto, A. S.; Paniago, R. M.; Leite, C. F.; Silva, G. G. *Surface properties of oxidized and aminated multi-walled carbon nanotubes*. J. Brazilina Chem. Soc., **2012**, 23:197.

7. ACKNOWLEDGEMENT

Universidade de Brasília