

## USE OF ACTIVATED CARBON FIBER FELT, FROM BRAZILIAN TEXTILE PAN FIBER, TO REMOVAL METALS FROM WASTE WATER

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### 1. Introduction

Activated carbon fibers (ACFs) are nano porous material and are known as excellent adsorbent materials due to their fast adsorption rate and easy handling characteristic [1]. The ACFs can be manufactured from the Polyacrylonitrile fiber, based on a usual carbon fibers (CFs) production process accomplished by an additional activation process. In this work activated carbon fiber felt from Brazilian textile PAN fiber was used to remove copper, iron, silver, nickel, manganese from aqueous solution, simulating waste water.

### 2. Experimental

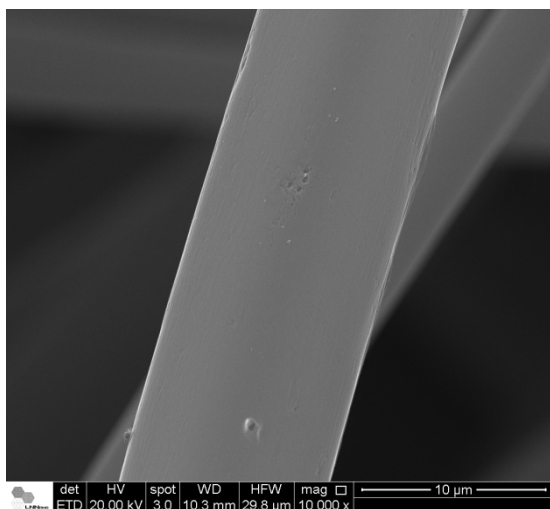
The ACF felt was produced in 3 steps. The first a commercial 200 k tow of 5.0 dtex textile PAN fibers was oxidized in a laboratory scale oven set by PIPE FAPESP N° 07/51606-5. The second step the oxidized material was converted in felt (200g/m<sup>2</sup>) by standard textile process. After that, the felt was carbonized and activated in laboratorial setup supported by PIPE FAPESP 12/51087-6.

The waste water cleaning essay was performed by using synthetic solution based in metallic nitrate salt. The concentration for solutions was fixed in 5g/l. The sample felt, weighting about 5g with 10 cm x 10 cm, was displaced into one liter solution during 24h. The solutions used were analyzed before and after essay to estimate the amount of metal removal.

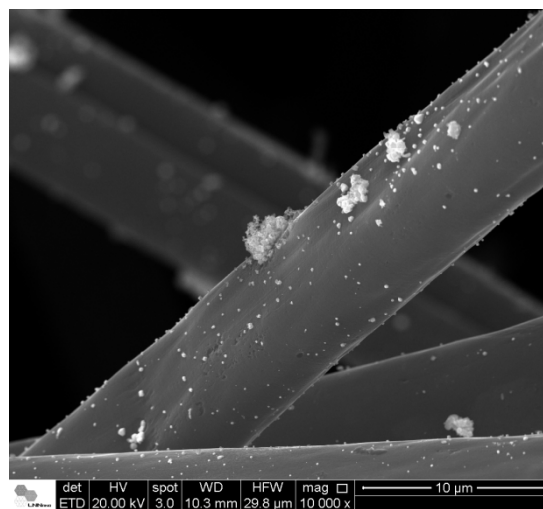
### 3. Results and Discussions

The ACF characterization was done by 77 K N<sub>2</sub> isotherms and SEM. The results confirmed the production of essentially micro porous (pore < 3.2 nm, centered on 1.2 nm), 1,300 m<sup>2</sup>/g activated carbon fiber felt. The Figure 1 shows a micrograph of ACF felt. The surface is very clean without grooves, holes or damages that characterize macro and meso-pores. This fact infers that ACF are micro pores material essentially.

The Figure 2 shows ACF felt after essay with aqueous silver nitrite. The DRX spectra show the particles in the surface are metallic silver. The final silver concentration in the ACF was 21 µg/cm<sup>2</sup>; this means about 2,1g of silver removed from the initial solution. The same results were found for aqueous solution of copper, iron, nickel, manganese.



**Fig. 1.** Activated carbon fiber filament from ACF after activation process.



**Fig. 2.** Activated carbon fiber filament from ACF after silver removal essay.

### 4. References

[1]- A. L. Solano and D. C. Amorós “Adsorption by carbon”, Elsevier, (2008).

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