



**PREPARATION OF POLYSULFONE MEMBRANE WITH  $\alpha$ -  
TOCOPHEROL AND  $\alpha$ -LIPOIC ACID TO REDUCE OXIDATIVE  
STRESS**

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Alice Santos-Silva<sup>3</sup>, Conceição Montenegro<sup>2</sup>

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Chronic kidney disease patients regularly undergoing hemodialysis treatment present high levels of oxidative stress and chronic inflammation biomarkers caused by treatment itself, besides the disease conditions. The long-term contact of blood with artificial material of the hemodialysis membrane causes overstimulation of inflammatory cells, leading to oxidative stress related complications in these patients. Polysulfone is nowadays the most used polymer for hemodialysis membranes, due to its improved biocompatibility. To minimize the negative oxidative stress related complications of hemodialysis procedure, the bioactive hollow-fiber polysulfone membranes modified with vitamin E are currently commercially produced and used at hemodialysis clinics [1]. Lipoic acid was also proposed and evaluated in terms of inhibition of reactive oxygen species in blood [2], although any comparison was done with vitamin E, concerning the antioxidant activity.

Our aim was to prepare bioactive polysulfone membranes (with  $\alpha$ -tocopherol or  $\alpha$ -lipoic acid) and compare them in terms of membrane structure, separation characteristics, as well as antioxidant capacity.

The membranes were prepared by dissolving the bioactive compounds in polysulfone solvent *N*-methyl-2-pyrrolidone and casted on silicon wafer by spin coating, followed by phase inversion process. The release of  $\alpha$ -tocopherol or  $\alpha$ -lipoic acid from the membranes, during the phase inversion, was quantified by fluorometry and UV spectrophotometry, respectively. The antioxidant activity of membranes was evaluated by using ferric reduction antioxidant power (FRAP) assay.

Our data showed that membranes enriched with  $\alpha$ -lipoic acid, compared to  $\alpha$ -tocopherol, presented better separation characteristics of biomolecules. Nevertheless, the FRAP assay showed (2 fold) lower antioxidant activity for the membranes enriched with  $\alpha$ -lipoic acid, then with  $\alpha$ -tocopherol, demonstrating a stronger antioxidant power. Despite that, due to favorable effect of  $\alpha$ -lipoic acid on separation characteristics of the membranes as well as its antioxidant activity, the introduction of  $\alpha$ -lipoic acid into polysulfone membranes looks promising. Studies concerning the reduction of oxidative stress in blood are under study in our group.

*Acknowledgements:* This work was financially supported by the Charles University Grant Agency, project GAUK 860216 and by project of specific research of Charles University, project SVV 260 412.

[1] Wenten, I. G., *et al. J. Membr. Sci. Res.* **2016**, 2(2), 78-89.

[2] Mahlicli, F. Y., *et al. J. Membr. Sci.* **2014**, 449, 27-37.