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Post-doctoral position within the Fondation de la Recherche Médicale (FRM)

Physico-chemical multi-scale microfluidic approach to study the growth of kidney stones: Can we prevent them?

Nephrolithiasis is a major health concern in western countries. Kidney stones (KS) result in repeated hospitalizations, and sometimes in kidney infections, chronic kidney disease, and renal replacement therapies. Limiting our analysis to France, the related costs per year are estimated to more than 600 million €. KS may result from either: (i) Randall's plaque (RP)– calcium phosphate (CaP) deposits at the tip of the renal papilla, or from: (ii) tubular plugs - made of calcium phosphate or calcium oxalate (CaOx)

Microfluidics has been reported as an efficient physico-chemical approach for the elaboration and the investigation of growth mechanisms of inorganic materials. In the field of KS we have developed a 2D reversible microfluidic system to mimic the dimensions of the collecting duct in a nephron where we studied the interfacial formation of CaOx. In the continuity of this work, the main objective of this project is to engineer a multi-scale reversible μ -fluidic device accounting for more realistic conditions (geometry, flow, coatings, etc) in order to study the precipitation of CaP/CaOx urinary plugs as well the growth of CaOx on RP. In the second step, the microsystem will be used as a platform for testing new drugs such as chemical inhibitors and their effect on the crystals with the final goal to prevent their formation. This work will be led in tight collaboration with the group of Prof. E. Letavernier (Hopital Tenon, Inserm UMR 702).

References

- (1) D. Bazin et al. Characterization and some physico-chemical aspects of pathological micro-calcifications, *Chem. Rev.* 2012, **112**, 5092 --- 5120.
- (2) A. Abou-Hassan et al., *Angew. Chem. Intl. Ed.* 2010, **49**, 6268-6286.
- (3) G. Laffite et al., *Lab on Chip*, 16, 1157 (2016).

Candidate's profile: A successful candidate should have the following qualifications:

- An earned Ph.D. or other equivalent degree in Physical-Chemistry, Inorganic Chemistry, Chemical Engineering or a related engineering field
- A solid background and hands-on experience in microfluidic devices
- An excellent team player with excellent writing and communication skills

Duration & salary: 24 months. Salary about 2400 € (monthly gross pay and can be increased to 2600€ depending on the years of experience)

Application: The position will be available from the 1st of October 2019. The candidate screening process will continue till the end of June. Interested individuals should forward by e-mail a cover letter outlining previous experience, a CV and the names and addresses (including e-mail address) of two references to:



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