

## סמינר כימיה פיסיקלית ואנליטית

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נושא:

## HOW TO USE THE DRYING PATTERN OF POOL WATER DROPLETS AS AN ANALYTICAL TOOL?

This research was performed under the supervision of  
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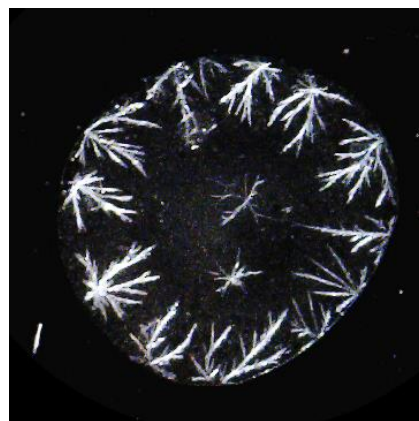
ההרצאה תתקיים בחדר סמינרים הפקולטי

## How to use the drying pattern of pool water droplets as an analytical tool?

It has been reported [1] that the drying pattern of blood serum droplets can be used for diagnosis of some diseases and the drying patterns of saliva samples can indicate pregnancy of buffalo cows [2]. We tested the potential of drying pattern of water drops for quantification of chemicals. We discovered that drying pool water consisting of cyanuric acid, forms a radial fractal shape pattern, which can be used for detection and quantification of this compound. The drying pattern consists of columns of sediments, growing from the perimeter to the center of the spot. Such pattern was not observed for other regular constituents of pool water.

Cyanuric acid is used as a stabilizing agent for chlorine in swimming pools.[3] Many of the commercial reagents for swimming pools already include cyanuric acid. This compound is very stable, so its concentration continuously increases. In high concentrations, the equilibrium between cyanuric acid and chlorine causes too low chlorine concentration, avoiding proper pool sanitation. The only known remedy is diluting with fresh water.

Accurate analysis of cyanuric acid in water requires expensive laboratory equipment. Low-cost methods are available, but they are very inaccurate. We suggest a new low-cost and simple method for determination of cyanuric acid in water, based on the unique drying pattern of the water droplets. It can be imaged using a simple digital camera, under side lightening (dark field mode).



The conditions required to form this specific drying pattern, the physical explanations of its dendritic shape and several image processing algorithms for determination of cyanuric acid were investigated.

1. Hong Y, Li Y & Huang L, et al. Label-free diagnosis for colorectal cancer through coffee ring-assisted surface-enhanced Raman spectroscopy on blood serum, *J. Biophotonics*. 2020; 13:e201960176. <https://doi.org/10.1002/jbio.20196017610>
2. M. M. M. Kandiel, H. M. Badr, M. E. Lasheen & M. H. Eldawy, The Value of Cyclical Saliva Crystallization Patterns for the Prediction of Buffaloes Pregnancy Status, *J. Animal and Poultry Prod., Mansoura Univ.*, 2017, Vol.8 (9): 363-365. [https://jappmu.journals.ekb.eg/article\\_46006.html](https://jappmu.journals.ekb.eg/article_46006.html)
3. Salter, C. & Langhus D.L., The Chemistry of Swimming Pool Maintenance, *J. Chem. Educ.* 2007, 84, 7, 1124. <https://doi.org/10.1021/ed084p1124>