Electronic supplementary materials for:

Low-density solvent based dispersive liquid-liquid microextraction followed by vortex-assisted magnetic nanoparticles based solid-phase extraction and surfactant enhanced spectrofluorimetric detection for determination of aflatoxins in pistachio nuts

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Effect of extracting solvent volume in DLLME:

The volume of extracting solvent is another important parameter affecting the cloudy state formation and efficiency of extraction process. So, the effect of 1-hepanol volume on the extraction of AFs was investigated in the range of 250-350 μL. The obtained results (Fig. S2 supplementary materials) revealed that the fluorescence intensity of AFs increases with increasing 1-heptanol volume in the range of 290 to 330 μL. Decreasing in signal intensity above 330 μL is due to the dilution effects and in down to 290 μL corresponds to the dissolution of organic phase in aqueous media. Based on the results, 310 μL was selected as an optimum volume for further studies.

Effect of salt addition in DLLME:

Addition of salt to the sample may have several effects on the extraction efficiency of the analyte. Generally, salt addition can decrease solubility of target analyte in aqueous phase and promote analyte transfer toward the organic phase resulting to the improvement in the extraction efficiency and known as salting-out effect [1]. On the other hand, salt addition increases viscosity and density of sample solution and it can reduce the efficiency of emulsification phenomenon because of lower solubility of extracting solvent in aqueous phase. In this study, the effect of salt addition on the extraction efficiency of AFs was investigated by adding different amounts of NaCl in the range of 0-5 % (w/v) to the samples. The obtained results (see Fig. S3, supplementary materials) shown that the extraction efficiency of AFs was not affected by the presence of NaCl. Thus, the experiments were carried out without adding salt.

3.3.4 Effect of water volume in DLLME:

The recovery of AFs was also affected by the water volume used in DLLME because it can influence the solubility of them in the aqueous phase. The effect of water volume on the extraction efficiency of the analytes was investigated using different volumes in the range of 2.5-25 mL. The results (Fig. S4, supplementary materials) were shown that the extraction efficiency was constant in the range of 12.5-18 mL. Based on the results, 15 mL was selected for the subsequent experiments.

1) Effect of dispersive solvent volume

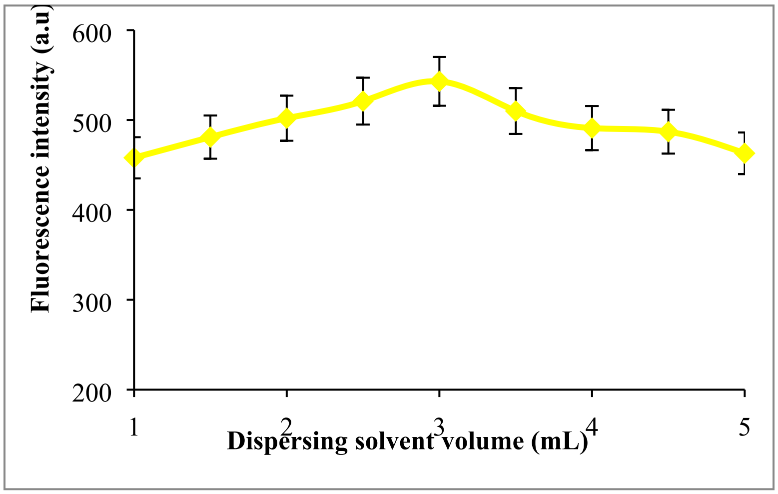

Fig. S1 Effect of dispersing solvent volume on the recovery of AFs. Conditions: dispersing solvent type, MeOH/water (80:20 v/v); extraction solvent volume and type, 310 μL of 1-heptanol; water volume, 15 mL; equilibrium time, 60 s; adsorbent amount, 60 mg; adsorption time, 2 min; desorption time, 3 min, desorption solvent volume and type, 2 mL of MeCN; without salt addition. Error bars represent the standard deviation for three experiments.

2. Effect of extraction solvent volume

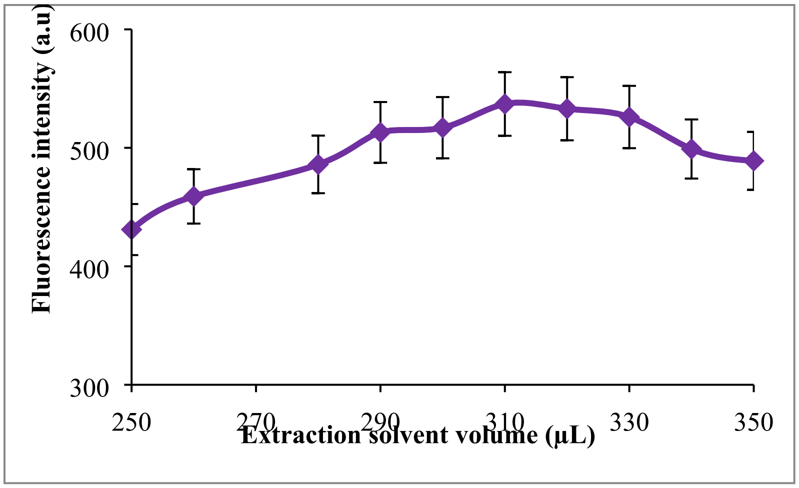

Fig. S2. Effect of the extraction solvent volume on the recovery of AFs. Conditions: dispersive solvent volume and type, 3 mL of MeOH/water (80:20 v/v); extraction solvent type, 1-heptanol; water volume, 15 mL; equilibrium time, 60 s; adsorbent amount, 60 mg; adsorption time, 2 min; desorption time, 3 min, desorption solvent volume and type, 2 mL of MeCN; without salt addition. Error bars represent the standard deviation for three experiments.

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3. Effect of salt addition

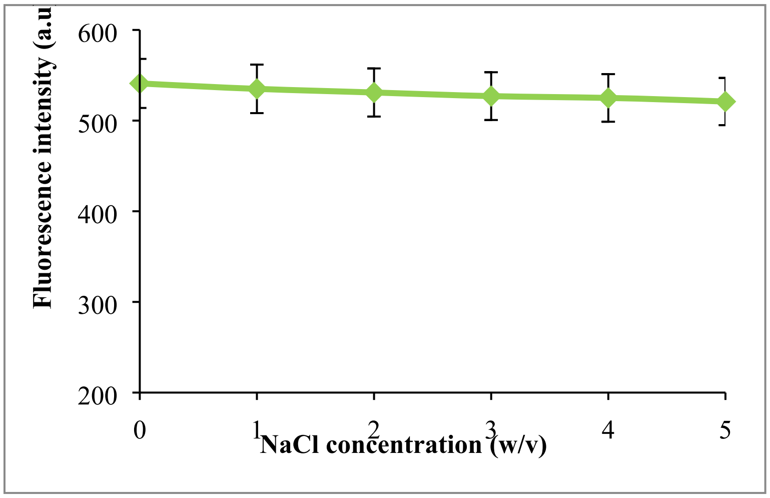

Fig. S3. Effect of salt addition on the recovery of AFs. Conditions: dispersive solvent volume and type, 3 mL of MeOH/water (80:20 v/v); extraction solvent volume and type, 310 μL of 1-heptanol; water volume, 15 mL; equilibrium time, 60 s; adsorbent amount, 60 mg; adsorption time, 2 min; desorption time, 3 min, desorption solvent volume and type, 2 mL of MeCN; Error bars represent the standard deviation for three experiments.

4. Effect of Water volume

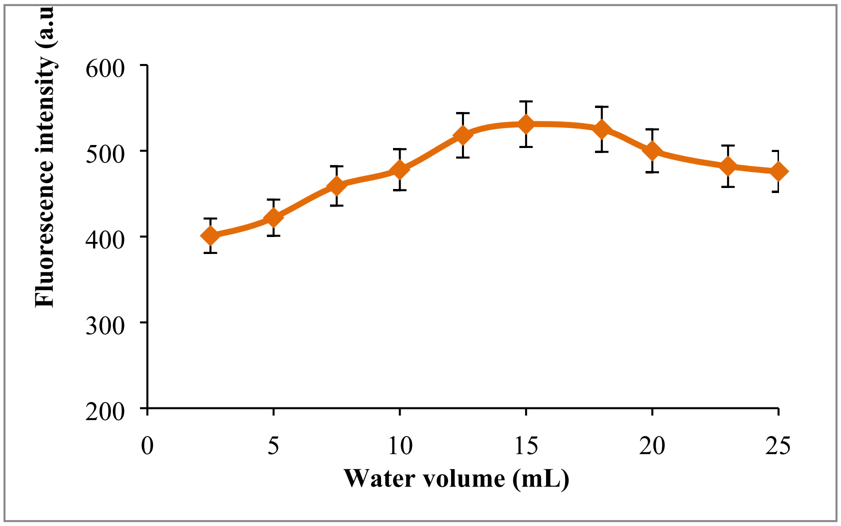

Fig. S4. Effect of the water volume on the recovery of AFs. Conditions: dispersive solvent volume and type, 3 mL of MeOH/water (80:20 v/v); extraction solvent volume and type, 310 µL of 1-heptanol; equilibrium time, 60 s; adsorbent amount, 60 mg; adsorption time, 2 min; desorption time, 3 min, desorption solvent volume and type, 2 mL of MeCN; without salt addition. Error bars represent the standard deviation for three experiments.

5. Effect of equilibrium time

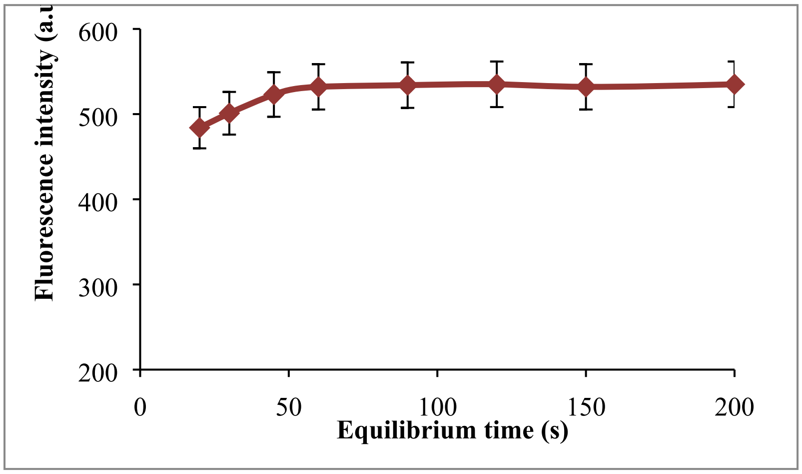

Fig. S5. Effect of the equilibrium time on the recovery of AFs. Conditions: dispersive solvent volume and type, 3 mL of MeOH/water (80:20 v/v); extraction solvent volume and type, 310 µL of 1-heptanol; water volume, 15 mL; adsorbent amount, 60 mg; adsorption time, 2 min; desorption time, 3 min, desorption solvent volume and type, 2 mL of MeCN; without salt addition Error bars represent the standard deviation for three experiments.

6. Effect of adsorbent amount

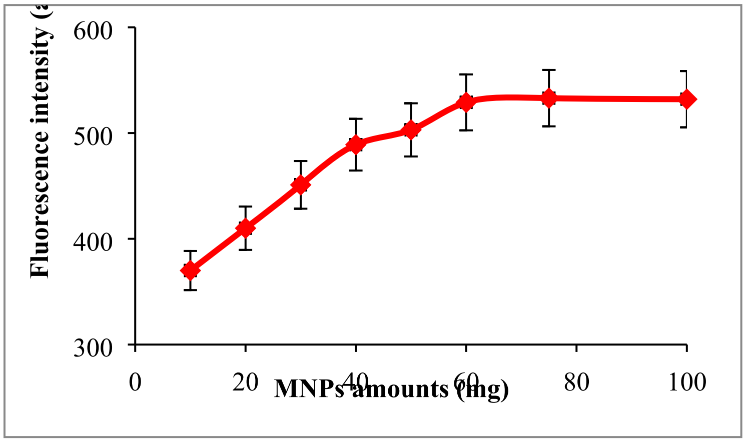

Fig. S6. Effect of the adsorbent amount on the recovery of AFs. Conditions: dispersive solvent volume and type, 3 mL of MeOH/water (80:20 v/v); extraction solvent volume and type, 310 µL of 1-heptanol; water volume, 15 mL; equilibrium time, 60 s; adsorption time, 2 min; desorption time, 3 min, desorption solvent volume and type, 2 mL of MeCN; without salt addition. Error bars represent the standard deviation for three experiments.

7. Effect of adsorption time

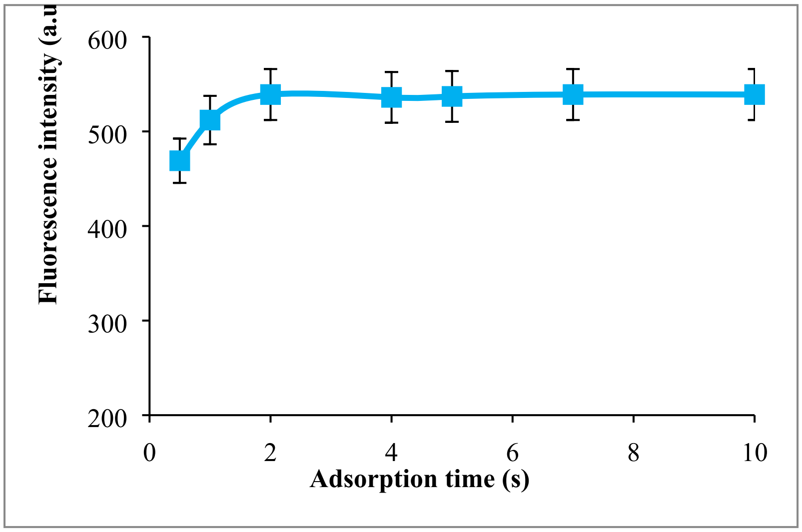

Fig. S7. Effect of the adsorption time on the recovery of AFs. Conditions: dispersive solvent volume and type, 3 mL of MeOH/water (80:20 v/v); extraction solvent volume and type, 310 µL of 1-heptanol; water volume, 15 mL; equilibrium time, 60 s; adsorbent amount, 60 mg; desorption time, 3 min, desorption solvent volume and type, 2 mL of MeCN; without salt addition Error bars represent the standard deviation for three experiments.

8. Effect of desorption solvent volume

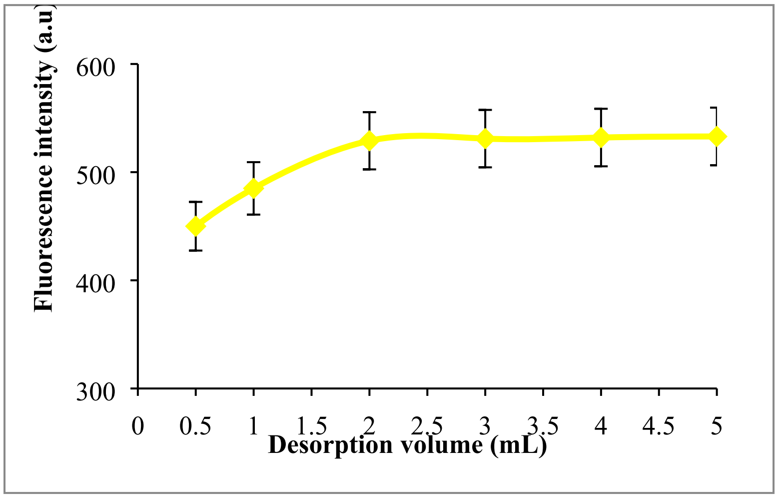

Fig. S8. Effect of desorption solvent volume on the recovery of AFs. Conditions: dispersive solvent volume and type, 3 mL of MeOH/water (80:20 v/v); extraction solvent volume and type, 310 µL of 1-heptanol; water volume, 15 mL; equilibrium time, 60 s; adsorbent amount, 60 mg; adsorption time, 2 min; desorption time, 3 min; desorption solvent type, MeCN; without salt addition Error bars represent the standard deviation for three experiments.

9. Effect of desorption time

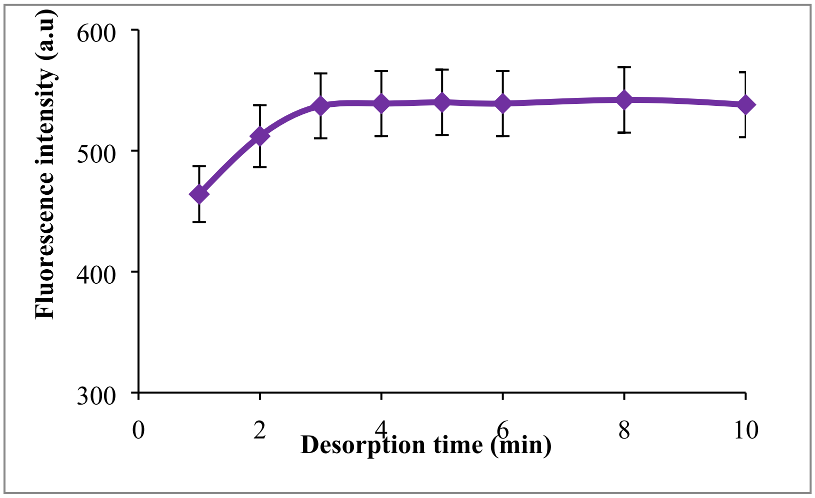

Fig. S9. Effect of desorption time on the recovery of AFs. Conditions: dispersive solvent volume and type, 3 mL of MeOH/water (80:20 v/v); extraction solvent volume and type, 310 µL of 1-heptanol; water volume, 15 mL; equilibrium time, 60 s; adsorbent amount, 60 mg; adsorption time, 2 min; desorption solvent volume and type, 2 mL of MeCN; without salt addition. Error bars represent the standard deviation for three experiments.

Reference:

1. M. Hashemi, N. Jahanshahi and A. Habibi, *Desalination*, 2012, 288, 93-97.