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Green fluorescent Protein from Aequorea coerulescens behavior

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Green Fluorescent Protein (GFP) is intensively used in biomedical sciences (Tsien, R.Y. 1998). Thanks to its peculiar characteristics GFP can be used as a tool to introduce a fluorescent tag into biological system and for example to image when and where a specific protein is being expressed. Green fluorescent proteins were first discovered in the 1960s at the University of Washington in a jellyfish named Aequorea victoria and first cloned in the 1980s. However, what exactly the GFPs were going to be used for was somewhat of a mystery until the 1980s and 90s. Since then, GFPs have been a popular focus for scientists and researchers interested in learning more about the movement of proteins in cells. In nature many invertebrates, can produce bright flashes through GFP, as an electromagnetic radiation source with specific wavelength in response to external stimulation (Gurskaya et al. 2003). In fact GFP has a photo protective function: in recent studies GFPs were used to understand the effects of heavy and essential metals on the fluorescence intensity of these proteins.
Previous studies carried out on additions of Hg (Bozkurt and Cavas, 2009) and Cu (Isarankura-Na-Ayudhya et al. 2009) suggest that the occurrence of these elements strongly influence the intensity of GFP fluorescence emission, whereas Ca and Zn additions up to 500 μM show only limited effects (Isarankura-Na-Ayudhya et al. 2009). In this study, we investigated the spectroscopic properties of recombinant GFP from Aequorea coerulescens (Clontech) "rAcGFP1" in presence of environmental contaminants as Cd, Ni and Pb potentially dangerous for human health. This experiment is conceived in the context of the study of fluorescent proteins suitability as Biosensors. Indeed, devices based on uv-visible fluorescence of biomolecules could be used as suitable tools to observe and monitor occurring contamination conditions also in situ. The absorption and the emission spectra of GFP were monitored as a function of metal ions concentration ranging from 1 and 100 μM. The observed variations in the GFP emission spectra in the observed conditions suggest the sensitivity of GFP fluorescence to the presence of the different metal ions.

REFERENCES

Isarankura-Na-Ayudhya, C., Tantimongcolwat, T., Galla, H.-J., Prachayasittikul, V. (2010) Biological Trace Element Research, 134, 352-363.

Tansila, N., Tantimongcolwat, T., Isarankura-Na-Ayudhya, C., Nantasenamat, C., Prachayasittikul, V. (2007) International Journal of Biological Sciences, 3, 463-470.

Gurskaya, N.G., Fradkov, A.F., Pounkova, N.I., Staroverov, D.B., Bulina, M.E., Yanushevich, Y.G., Labas, Y.A., Lukyanov, S., Lukyanov, K.A. (2003) Biochemical Journal, 373, 403-408.

Tsien, R.Y. (1998) Annual Review of Biochemistry, 67, 509-544.