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MEASUREMENT AND CALCULATION OF OPTICAL PARAMETERS OF BIODYNAMIC LIGHT SOURCE

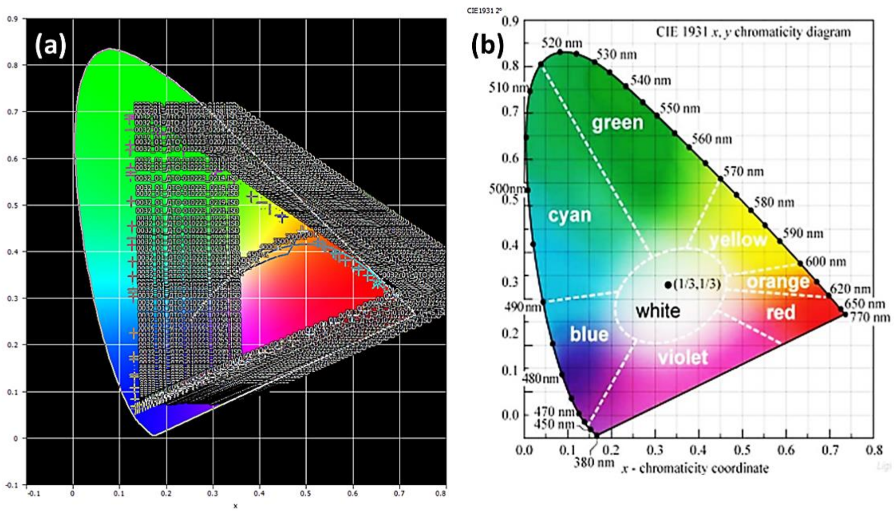
Graduate student Zhang Y.[1]
PhD, docent Saukova Y.[2]
[1]Scientific Research Institute of Natural Graphite Application Technologies “Zhuisheng”, Ulankab, China
[2]Belarusian National Technical University, Minsk, Belarus

The natural light environment is the working environment that people are most accustomed to and love, and it can best meet people's physical and psychological needs. However, in architectural design, natural light is uneven and unstable, and artificial light sources are required to fill the light. In order to ensure the comfort of the light environment, a biodynamic light source has been developed. The light source combines human circadian rhythm, simulates the natural light environment by changing the brightness and spectral composition, improves people's indoor visual environment, and then improves people's quality of life. Herein, this test measures and calculates various optical parameters of the biodynamic light source which provides a theoretical and experimental basis for the subsequent improvement of the program design of the biodynamic light source.

Gall et al. [1] proposed the concept of photobiological rhythm factor to quantitatively evaluate the non-visual biological effects of light on the human body, which can be expressed as:

$$a_{cv} = \frac{\int_{380}^{780} P(\lambda)C(\lambda)d\lambda}{\int_{380}^{780} P(\lambda)C(\lambda)d\lambda}. \quad (1)$$

The results of the spectral analysis are shown on fig. 1.



a *b*

Fig. 1. 1931 CIE chromaticity Diagram: *a* – In test; *b* – Standard

By selecting different types of light sources and using devices such as filters or reflectors, the spectral composition of the light source can be adjusted, thereby optimizing the spectral composition while saving energy. Spectrum composition optimization is a complex problem, which requires comprehensive consideration of various factors, and the selection of appropriate methods and light sources according to different usage scenarios and needs. With the continuous development of intelligent control technology, the future light environment will be more intelligent and adaptive, so as to create a comfortable, healthy and efficient light environment which is suitable for human life.

Reference

1. Gall, D. Definition and measurement of circadian radiometric quantities / D. Gall, K. Bieske // Proceedings of 2004 CIE Symposium on Light and Health, Vienna, 2004. – P. 129–132.