Claims:

1. A method of determining a future color value or corresponding future property of a protein-containing solution or of a protein-containing product prepared therefrom, comprising:

exciting fluorescent radiation of the solution or product,

measuring at least one property, preferably a spectrum or corresponding feature, of the fluorescent radiation, and

determining the future color value or corresponding future property of the solution or product based on a correlation between the at least one property of the fluorescent radiation and a present or the future color value or corresponding property of the solution or the product.

2. The method according to claim 1, characterized in that the present color value is determined by means of the correlation and used as a basis for a prediction of the future color value or corresponding future property.

3. The method according to claim 1, characterized in that the correlation is performed directly between the at least one property of the fluorescent radiation and the future color value or corresponding future property of the solution or the product.

4. The method according to any one of the preceding claims, characterized in that the present or future color value or corresponding property of the solution or the product is determined based on the at least one property of the fluorescent radiation by using an artificial intelligence, preferably a Machine Learning model, in particular an artificial neural network, or using a regression model, preferably for numerical regression or classification by means of at least one regression parameter,

wherein the artificial intelligence, preferably the Machine Learning model, in particular the artificial neural network, is trained or the regression model is determined using a reference spectrum or features thereof, and the present or future color value or property of the solution or the product corresponding to the present or future color value.

5. The method according to claim 4, characterized in that the artificial intelligence, preferably the Machine Learning model, in particular the artificial neural network, is trained or the regression model is determined, wherein intensity - wavelength pairs of the fluorescent radiation, preferably taken from a fluorescent radiation spectrum, are specified as input for a plurality of solutions or products, a present or future color value or corresponding property is specified as target, and the at

least one weight defining a property of the neural network is configured, or is determined, or is adapted such that the artificial neural network based on the artificial neural network outputs or is configured to output the specified present or future color value or corresponding property when the respective intensity - wavelength pair is input.

6. The method according to claim 4 or 5, characterized in that based on the at least one property of the fluorescent radiation, the future color value or corresponding future property of the solution or product is predicted for a future phase of the production method for producing the solution or product.

7. The method according to any one of claims 4 to 6, characterized in that the artificial neural network is pre-trained or the method comprises pre-training of the artificial neural network, wherein for a plurality of samples in each case

a. an – in particular current and/or future – protein concentration of the solution or product, and/or

b. an integral of the fluorescent radiation intensity – in particular an area under the curve of the fluorescent radiation intensity

are used as input, and a present and/or future color value or corresponding property of the solution or product is specified as target, and a weight defining a property of the artificial neural network is determined or adapted such that, when the respective protein concentration and/or the integral of the fluorescent radiation intensity are input, the present or future color value or corresponding property is predicted.

8. The method according to claim 7, characterized in that for the plurality of samples a fluorescent radiation intensity wavelength pair and/or a production process phase is or are used as further inputs; and/or that the at least one property of the fluorescent radiation or present or future color value or corresponding property of the solution or product is or are predicted.

9. The method according to any one of the preceding claims, characterized in that a production process of a protein-containing solution or of a protein-containing product prepared therefrom is controlled based on the at least one property of the fluorescent radiation or based on the future color value or corresponding future property determined based on the fluorescent radiation.

10. The method according to claim 9, characterized in that at least one process parameter of the production process, in particular of a purifying step, is determined or controlled based on the at least one property of the fluorescent radiation or future color value or corresponding future property.

11. The method according to any one of the preceding claims, characterized in that one or more of:

a fluorescence exciting radiation has a maximum intensity at a wavelength greater than 310 nm and less than 540 nm, preferably greater than 360 nm and less than 420 nm, in particular greater than 380 nm and less than 400 nm,

the fluorescent radiation is detected within a wavelength range at least from 330 nm to 800 nm,

the fluorescent radiation has a maximum intensity at a wavelength greater than 330 nm and less than 800 nm, preferably greater than 420 nm and less than 600 nm, particularly greater than 450 nm and less than 530 nm, an intensity maximum of the fluorescent radiation is at a wavelength which is more than 60 nm and/or less than 130 nm above the wavelength at which the fluorescence exciting radiation has a maximum intensity, and/or

the present or future color value or corresponding property corresponds to a yellowish or brownish-yellowish coloration, preferably characterized in that light being transmittable, reflectable or scatterable by the solution or product with a maximum transmittance, reflectance or scattering at a wavelength greater than 560 nm and/or less than 620 nm.

12. The method according to any one of the preceding claims, characterized in that the solution or product comprises recombinant proteins or antibodies, preferably monoclonal antibodies, and the present or future color value or corresponding property is a characteristic of their, preferably pharmacological, usability.

13. The method according to any one of the preceding claims, characterized in that a production process phase is taken into account for determining the present or future color value or corresponding property.

14. The method according to any one of the preceding claims, characterized in that a protein concentration is taken into account for determining the present or future color value or corresponding property.

15. The method according to any one of the preceding claims, characterized in that the solution is a sample comprising a recombinant protein obtained in one of steps (i) to (vi) or (a) to (g) of a process comprising the steps of:

(i) cultivating a eukaryotic cell expressing the recombinant protein of interest in cell culture;

(ii) harvesting the recombinant protein;

(iii) purifying the recombinant protein, preferably comprising one or more of:

(a) affinity chromatography
(b) depth filtration,
(c) anion-exchange chromatography
(d) cation-exchange chromatography,
(e) mixed-mode chromatography,
(f) virus filtration, and/or
(g) ultrafiltration/diafiltration,

and

(iv) formulating the recombinant protein into a pharmaceutically acceptable formulation suitable for administration as product, in particular pure bulk drug substance in buffer solution,

wherein the fluorescent radiation is excited with the sample, and wherein the future color value or corresponding property is determined for a different, subsequent of the steps (i) to (iv) or (a) to (g).

16. The method according to any one of the preceding claims, characterized in that the fluorescent radiation has a wavelength and/or intensity, in particular a value pair of a wavelength and a corresponding intensity, based on which the present or future color value or corresponding property of the solution or product is determined.

17. The method according to any one of the preceding claims, wherein the fluorescent radiation parameter is determined from a sample of the solution or product when held in a well of a microtiter plate.

18. The method for producing a protein-containing solution or a product produced therefrom, comprising the steps of:

(i) cultivating a eukaryotic cell expressing a recombinant protein of interest in cell culture;

(ii) harvesting the recombinant protein;

(iii) purifying the recombinant protein; and

(iv) optionally formulating the recombinant protein into a pharmaceutically acceptable formulation suitable for administration; and

(v) obtaining at least one sample comprising the recombinant protein in steps (ii), (iii) and/or (iv);

wherein the sample is the solution or product, and wherein the method further comprises performing the method steps according to any one of the preceding claims.

19. An arrangement comprising a light source, a spectrometer for measuring a fluorescent radiation, and a device adapted to carry out the method according to any of the preceding claims based on the fluorescent radiation.