

BIOCHROMATICS

Decoding the Spectral Signatures of Health and Disease

A Scientific Framework for Chromatic Diagnostics and
Spectral-Guided Photonic Therapy

Conceptualized and Developed by Jay Schorr

Founder, Biochromatics, Inc.

Scientific White Paper

Biochromatics, Inc. | 2026

PATENT PENDING

THE CENTRAL PROPOSITION

Healthy and diseased cellular states may produce measurably different spectral signatures. If those differences can be captured, cataloged, cross-referenced, and validated, they may provide both a new means of detecting disease and a scientific basis for developing precisely targeted light-based therapies.

COPYRIGHT & INTELLECTUAL PROPERTY NOTICE

© 2026 Biochromatics, Inc. All Rights Reserved.

Biochromatics concept conceived, conceptualized, and developed by Jay Schorr.

This document contains proprietary concepts, terminology, methodologies, system architectures, and research strategies of Biochromatics, Inc. No portion of this document may be reproduced, distributed, transmitted, or used for commercial purposes without the prior written permission of Biochromatics, Inc., except for brief quotations used with appropriate attribution.

PATENT PENDING. Certain technologies, methods, systems, processes, and applications described in this white paper are the subject of pending patent protection where applicable. No license or other intellectual-property right is granted or implied by distribution of this document.

CONFIDENTIAL & PROPRIETARY. This white paper is provided for evaluation, research, investment, partnership, and strategic-discussion purposes. Proprietary non-public information contained herein should not be disclosed except as authorized by Biochromatics, Inc.

Executive Summary

Biochromatics is founded on a straightforward proposition: healthy and diseased cellular states may produce measurably different spectral - or chromatic - signatures, and if those differences can be systematically captured, cataloged, cross-referenced, and validated, the resulting information could provide both a new means of detecting disease and a scientific basis for developing precisely targeted light-based therapies.

Living biological systems are already known to produce measurable photon emissions associated with biochemical and oxidative processes. Biochromatics begins with that established phenomenon and asks a further question: do healthy and pathological cellular states produce sufficiently reproducible differences in their spectral output to permit the construction of reference baselines for health and disease?

The proposed answer is the Chromatome: a multidimensional atlas of validated cellular, tissue, organ-specific, and potentially systemic spectral signatures. A patient's or sample's measured signature could be compared with those baselines to identify deviations from healthy states and similarities to validated pathological patterns.

The second half of the Biochromatics concept is therapeutic. The spectral difference between a validated healthy state and a pathological state could be used as information for experiments designed to determine which light parameters - wavelength, irradiance, fluence, timing, pulse structure, and anatomical targeting - can modulate the underlying abnormal cellular processes toward the healthy state. Movement of the measured signature toward the healthy baseline could then serve as a real-time feedback signal, provided that spectral change is correlated with independent biochemical and clinical endpoints.

This creates the defining Biochromatics loop:

**MEASURE THE LIGHT → DECODE THE SIGNATURE → IDENTIFY THE
DEVIATION → APPLY TARGETED LIGHT → MEASURE AGAIN**

The disease-associated signature indicates what is different. The healthy baseline indicates the target state. Light becomes both an information source and a potential therapeutic instrument.

1. The Biochromatics Thesis

1.1 Healthy and diseased states may have distinguishable spectral phenotypes

Cells continuously transform energy through biochemical and biophysical processes. Some of these processes produce photons. The existence of spontaneous biological photon emission is documented in peer-reviewed literature and is not itself the Biochromatics hypothesis.[1,2]

The Biochromatics proposition begins with the possibility that changes in cellular chemistry, metabolism, redox state, signaling, structure, and disease processes may alter measurable properties of those emissions. A healthy cell and a diseased cell therefore need not produce identical multidimensional spectral patterns.

Biochromatics calls the measurable pattern associated with a defined biological state a Cellular Spectral Signature (CSS). A CSS may incorporate wavelength distribution, photon flux, intensity, spatial distribution, temporal behavior, and relevant biological variables.

1.2 From individual signatures to biological baselines

A single spectral observation has limited diagnostic value. Biochromatics therefore proposes systematic measurement across large numbers of well-characterized biological samples. Healthy signatures would be cataloged and cross-referenced to establish normal baselines. Disease-associated signatures would be cataloged in parallel and compared with matched healthy states.

The goal is not simply to assign a 'color' to a disease. It is to identify reproducible multidimensional spectral differentials associated with validated biological states.

1.3 From baselines to therapy

The central therapeutic proposition is that the healthy-versus-diseased spectral differential may contain information useful for selecting photonic interventions. Biochromatics does not assume that the abnormal spectrum itself is necessarily the cause of disease. It may instead be an observable phenotype of abnormal underlying biology.

Accordingly, therapy should be designed to test whether light selected with reference to the healthy and diseased spectral states can modulate the underlying cellular processes toward the healthy state. A movement in the spectral signature toward the healthy baseline would be treated as a candidate feedback signal, not by itself as proof of healing.

2. The Biochromatics Operating Model

The Biochromatics concept can be expressed as five connected operations.

Step 1 - Measure

Capture the spectral emission of a defined cellular, tissue, organ, or biological state using appropriately sensitive photon-detection and spectral-imaging technologies.

Step 2 - Decode and Catalog

Extract spectral features and store them with biological, clinical, environmental, and instrument metadata.

Step 3 - Compare

Cross-reference the measured signature against validated healthy and disease-associated baselines in the Chromatome.

Step 4 - Intervene

Where experimentally justified, use the spectral differential and established photobiology to inform selection of a light-based intervention.

Step 5 - Verify

Remeasure the spectral signature and compare it with the pretreatment state and healthy baseline, while simultaneously evaluating independent biological and clinical endpoints.

3. The Chromatome

The Chromatome is the proposed reference atlas at the center of Biochromatics. Conceptually analogous to a biological mapping project, it would organize validated spectral signatures across healthy and pathological states.

The original Biochromatics concept calls for photographing and cataloging chromatic signatures of healthy and pathogenically challenged cells, establishing healthy baselines, and using those data as a guide for subsequent treatment research. The revised scientific architecture preserves that thesis while expanding the measurement and validation framework.

3.1 What the Chromatome would contain

- Cellular and tissue spectral measurements and raw photon data;
- Validated health or disease status and disease stage;
- Cell, tissue, organ, and systemic classification where scientifically supportable;
- Wavelength distribution, photon counts, intensity, spatial and temporal features;
- Metabolic, oxidative, inflammatory, and other relevant biological measurements;
- Temperature, oxygenation, circadian, medication, demographic, and environmental covariates;
- Instrument, calibration, acquisition geometry, and quality-control metadata;
- Treatment exposures and longitudinal response measurements.

3.2 Healthy baselines

Healthy reference populations would define the range and variability of normal spectral states rather than a single universal 'healthy color.' Baselines may differ by tissue, organ, cell type, age, physiological condition, time of day, and other covariates.

3.3 Disease-associated baselines

Disease libraries would be built only from independently confirmed diagnoses. The critical question is whether the disease-associated distribution differs reproducibly from appropriately matched healthy controls with clinically useful discrimination.

4. Cellular Photonic Emission: The Physics Underneath Biochromatics

Cellular Photonic Emission (CPE) is the broader Biochromatics research framework for photon emission generated directly or indirectly by cellular biochemical and biophysical processes. CPE supports the central thesis; it does not replace it.

The established literature often uses the term ultraweak photon emission (UPE) for extremely low-intensity spontaneous photon emission detected from biological samples.[1,2] Biochromatics retains UPE as an established empirical foundation but does not assume that externally measured UPE represents every photon-generating event at its cellular source.

4.1 Why the measured signal may differ from source activity

- Photons can be absorbed or scattered before reaching an external detector;
- Biological chromophores can reabsorb emitted photons;
- Excited molecular energy can relax through non-radiative pathways;
- Short or highly localized events may be averaged by an acquisition system;
- Detector quantum efficiency and spectral range can exclude part of the signal;
- Tissue depth and composition can alter intensity and spectral distribution.

This creates a supporting Biochromatics question: how faithfully does the externally measured spectrum represent the source-level cellular spectral activity?

5. The Photonic Transfer Function

Biochromatics treats the path from cellular photon generation to measured signature as a transfer problem:

**SOURCE CELLULAR ACTIVITY → PROPAGATION / ABSORPTION / SCATTERING →
ESCAPING PHOTONS → DETECTOR RESPONSE → MEASURED CSS**

The measured signal can be represented conceptually as $M = F(S, B, G, D) + N$, where S is source activity, B represents biological optical transfer properties, G acquisition geometry, D detector response, and N noise.

The purpose of this model is not to make CPE the principal Biochromatics theory. Its purpose is to improve the accuracy with which the cellular spectral signature - the information needed for the Chromatome - is measured and interpreted.

6. Diagnostic Architecture: From Signature to Disease Classification

Biochromatics diagnostics would ask whether an unknown spectral signature can be classified by comparison with validated Chromatome baselines.

The proposed pathway is:

**PATIENT/SAMPLE CSS → QUALITY CONTROL → NORMALIZATION → CHROMATOME
COMPARISON → HEALTHY/ABNORMAL DIFFERENTIAL → VALIDATED DISEASE-
PATTERN MATCH → CLINICAL INTERPRETATION**

Any disease classifier must be validated independently using accepted diagnostic metrics including sensitivity, specificity, positive and negative predictive value, ROC curves, area under the curve, calibration, reproducibility, and prospective blinded testing.

A spectral signature should supplement or replace existing diagnostics only where evidence demonstrates that it provides clinically useful information.

7. Spectral-Guided Photonic Therapy (SGPT)

The term photodynamic therapy has a specific established meaning that commonly involves light, a photosensitizer, and molecular oxygen. The Biochromatics therapeutic concept is broader. This paper therefore uses Spectral-Guided Photonic Therapy (SGPT) as a working Biochromatics term.

7.1 Definition

Spectral-Guided Photonic Therapy is the proposed use of validated differences between healthy and pathological spectral signatures to help inform selection of wavelength, irradiance, fluence, exposure duration, pulse structure, treatment interval, and anatomical targeting intended to modulate pathological cellular processes toward a validated healthy state.

7.2 The spectral differential

For a defined disease state, Biochromatics would compare:

VALIDATED HEALTHY CSS ↔ VALIDATED DISEASE CSS

The difference between these states becomes a research input - not automatically a treatment prescription. Experiments would determine whether particular photonic parameters can alter the disease-associated biology and whether successful biological modulation is accompanied by movement of the CSS toward the healthy distribution.

7.3 Scientific foundation for light-based modulation

Photobiomodulation research demonstrates that selected wavelengths and doses can influence cellular signaling, mitochondrial-related processes, redox biology, nitric oxide pathways, and gene-expression responses under defined conditions.[4-6] Biochromatics asks whether individualized spectral information can make such intervention more precise.

8. The Closed-Loop Diagnostic-Therapeutic System

The distinctive Biochromatics proposition is the integration of diagnosis and treatment into a continuous feedback system.

**IMAGE / MEASURE → ANALYZE → COMPARE WITH CHROMATOME → IDENTIFY
SPECTRAL DIFFERENTIAL → SELECT PHOTONIC PARAMETERS → TREAT →
REMEASURE → VERIFY → ADJUST**

The healthy baseline supplies the reference target. The disease-associated state supplies the deviation. SGPT tests whether selected light can modulate the abnormal biological process. Remeasurement provides rapid feedback. Independent biochemical and clinical measurements determine whether the spectral change corresponds to genuine biological improvement.

9. Experimental Program

Phase I - Establish reproducible cellular spectral measurement

Demonstrate that photon measurements can be repeated reliably above environmental and instrument noise. Standardize dark conditions, temperature, detector calibration, sample preparation, acquisition time, geometry, and spectral response.

Phase II - Build healthy spectral baselines

Measure well-characterized healthy cells, tissues, and subjects while quantifying normal biological variability.

Phase III - Build disease spectral libraries

Compare confirmed disease states with matched controls and determine whether reproducible spectral differentials exist.

Phase IV - Validate classification

Lock candidate algorithms and test them prospectively on blinded independent cohorts.

Phase V - Determine the CPE transfer relationship

Use source-proximal and external measurements, optical phantoms, tissue models, and complementary detectors to determine how much spectral information is altered between cellular generation and external measurement.

Phase VI - Test SGPT

Use controlled cellular and preclinical models to determine whether spectral-state information improves selection of photonic treatment parameters.

Phase VII - Validate feedback

Determine whether movement of the CSS toward the healthy baseline correlates with accepted biochemical, pathological, physiological, and clinical outcomes.

10. Multiscale Research Strategy

- Molecular reactions: link defined biochemical reactions to photon emission;
- Single cells: characterize spectral states under controlled healthy and pathological conditions;
- Cell-to-cell interactions: determine whether cellular signaling or interaction produces reproducible spectral changes;
- Cell populations and organoids: examine emergent spectral patterns in more complex biological systems;
- Ex vivo tissues: quantify tissue-specific signatures and propagation effects;
- In vivo studies: evaluate diagnostic and longitudinal clinical utility after preclinical validation.

11. Instrumentation

Biochromatics should remain detector-agnostic during discovery. The objective is to capture the biologically useful signature, not to force the biology into the limitations of one instrument.

- Photomultiplier tubes and photon-counting systems;
- High-sensitivity EMCCD, intensified, or comparable cameras;
- Spectrometers;
- Hyperspectral and multispectral imaging systems;
- Time-resolved acquisition;
- Thermal infrared imaging as a distinct channel;
- Conventional biochemical and clinical assays for ground-truth validation.

Medical hyperspectral imaging has an established literature, although many systems analyze reflected or externally illuminated light rather than spontaneous cellular emission.[3]

Biochromatics instrumentation must therefore be optimized for the specific signal domain under study.

12. Artificial Intelligence

AI serves the Biochromatics thesis in three ways: pattern discovery, classification, and reconstruction.

- Pattern discovery: identify multidimensional spectral features associated with validated biological states;
- Classification: compare an unknown CSS with healthy and disease-associated Chromatome baselines;
- Reconstruction: where possible, compensate for known tissue and instrument transfer effects to better estimate source-associated spectral activity.

AI cannot substitute for biological ground truth. Models must be trained and validated against independently established diagnoses and outcomes.

13. What Biochromatics Must Prove

Question	Why It Matters	Evidence Required
Do healthy and diseased states produce reproducibly different CSS patterns?	Foundation of the diagnostic thesis.	Controlled comparisons with independent disease confirmation.
Can those patterns be cataloged into stable baselines?	Foundation of the Chromatome.	Large standardized datasets and reproducibility across sites/instruments.
Can an unknown sample be classified accurately?	Determines clinical diagnostic utility.	Prospective blinded validation.
Does the measured external signal preserve enough source information?	Determines measurement fidelity.	Transfer-function and source-proximal studies.
Can spectral differentials improve photonic treatment selection?	Foundation of SGPT.	Controlled treatment optimization studies.
Does movement toward a healthy CSS correspond to real biological improvement?	Foundation of closed-loop verification.	Correlation with independent biochemical and clinical endpoints.

14. What Is Established and What Remains a Biochromatics Proposition

Established / Supported Foundation	Biochromatics Proposition Requiring Validation
Living biological systems produce measurable ultraweak photon emission associated with biochemical and oxidative processes.[1,2]	Defined healthy and diseased states possess sufficiently reproducible spectral phenotypes for clinical classification.
Biological tissue absorbs and scatters light.	The externally measured CSS can be modeled sufficiently to infer clinically useful source-state information.
Light can influence biological processes under defined photobiomodulation conditions.[4-6]	The healthy-versus-disease spectral differential can improve selection of therapeutic photonic parameters.
Spectral imaging can provide spatial and wavelength-resolved biological information.[3]	The Chromatome can become a clinically useful atlas of cellular, tissue, organ, and systemic spectral states.
	Closed-loop remeasurement can provide validated near-real-time feedback about therapeutic response.

15. Initial Development Priorities

The first Biochromatics program should not attempt to prove the entire platform at once. It should seek the shortest rigorous path to demonstrating the central thesis.

- Select one or two accessible, well-characterized biological models with strong clinical ground truth;
- Demonstrate reproducible healthy-versus-disease spectral differentiation;
- Replicate the finding independently;
- Build the first disease-specific Chromatome module;
- Validate blinded classification;
- Only then test whether the spectral differential adds value to light-treatment selection.

Accessible tissues and controlled cell models may offer a more practical initial path than deep-organ applications because they reduce photon-propagation uncertainty.

16. Intellectual Property and Commercial Architecture

If validated, the strongest Biochromatics intellectual property may arise from the integrated system rather than a single detector or wavelength.

- Methods for measuring and normalizing CSS data;
- Healthy and disease-specific Chromatome datasets;
- Disease-specific spectral classifiers;
- CPE transfer-function calibration and reconstruction methods;
- SGPT parameter-selection algorithms;
- Closed-loop measurement-treatment-verification protocols;
- Specialized acquisition and light-delivery systems.

Commercially, the platform could combine diagnostic hardware, therapeutic hardware, AI/software subscriptions, Chromatome access, research partnerships, and disease-specific licensing. Patentability, freedom to operate, medical claims, and regulatory pathways require specialist review.

17. The Long-Term Vision

Modern medicine characterizes the body through anatomy, chemistry, electrical activity, genetics, molecular markers, and other measurable dimensions. Biochromatics asks whether validated cellular spectral behavior can become another such dimension.

If healthy and diseased biological states can be distinguished by reproducible spectral signatures, medicine could gain a new observable phenotype. If those signatures can be cataloged, they could become a diagnostic reference system. If the spectral differential can also guide photonic intervention, the same informational domain could connect diagnosis, treatment, and verification.

That is the central Biochromatics thesis:

THE CELL EMITS INFORMATION IN LIGHT. BIOCHROMATICS SEEKS TO READ THAT INFORMATION, MAP THE DIFFERENCE BETWEEN HEALTH AND DISEASE, AND DETERMINE WHETHER LIGHT ITSELF CAN BE USED - WITH THE MAP AS A GUIDE - TO MOVE DISEASED BIOLOGY TOWARD HEALTH.

18. Conclusion

Biochromatics is not principally a theory about detector sensitivity, UPE terminology, or photon transport. Those issues matter because they determine how accurately the central biological signal can be measured.

The central idea is simpler and more consequential: healthy and diseased cellular states may be associated with measurably different spectral signatures. Those signatures can be systematically studied, cataloged, cross-referenced, and validated to establish cellular, tissue, organ-specific, and potentially systemic baselines of health and disease.

The Chromatome is the map.

The Cellular Spectral Signature is the information.

CPE is the physical measurement framework.

Spectral-Guided Photonic Therapy is the proposed intervention.

The closed loop - measure, compare, treat, and measure again - is the Biochromatics system.

The research program should now determine, experimentally and without assumption, how far that system can be taken.

References

- [1] Cifra M, Pospíšil P. Ultra-weak photon emission from biological samples: Definition, mechanisms, properties, detection and applications. *Journal of Photochemistry and Photobiology B: Biology*. 2014;139:2-10. doi:10.1016/j.jphotobiol.2014.02.009.
- [2] Pospíšil P, Prasad A, Rác M. Role of reactive oxygen species in ultra-weak photon emission in biological systems. *Journal of Photochemistry and Photobiology B: Biology*. 2014;139:11-23. doi:10.1016/j.jphotobiol.2014.02.008.
- [3] Lu G, Fei B. Medical hyperspectral imaging: a review. *Journal of Biomedical Optics*. 2014;19(1):010901. doi:10.1117/1.JBO.19.1.010901.
- [4] Chung H, Dai T, Sharma SK, Huang YY, Carroll JD, Hamblin MR. The nuts and bolts of low-level laser (light) therapy. *Annals of Biomedical Engineering*. 2012;40(2):516-533. doi:10.1007/s10439-011-0454-7.
- [5] de Freitas LF, Hamblin MR. Proposed mechanisms of photobiomodulation or low-level light therapy. *IEEE Journal of Selected Topics in Quantum Electronics*. 2016;22(3):7000417. doi:10.1109/JSTQE.2016.2561201.
- [6] Hamblin MR. Mechanisms and mitochondrial redox signaling in photobiomodulation. *AIMS Biophysics*. 2017;4(3):337-361. doi:10.3934/biophy.2017.3.337.

Biochromatics Source Concept

This white paper develops the Biochromatics concept described in Jay Schorr's 2026 protocol, *Using Biochromatic Signatures as a Guide to Medical Diagnostics and Treatment*, which proposes cataloging chromatic signatures in healthy and pathogenically challenged cells, establishing baseline healthy and disease-associated states, and investigating whether the resulting information can guide light-based treatment.

The broader CPE material in this revision is intentionally subordinate to that central diagnostic-therapeutic thesis.

Scientific and Regulatory Disclaimer

Biochromatics is a research and development concept. Biological ultraweak photon emission is established in the scientific literature; however, the existence of clinically useful disease-specific Cellular Spectral Signatures, the diagnostic utility of the Chromatome, the ability to reconstruct source-level CPE from external measurements, and the efficacy of Spectral-Guided Photonic Therapy require experimental and clinical validation. A spectral change should not be interpreted as healing unless correlated with accepted independent biological and clinical endpoints. Nothing in this paper constitutes an approved medical claim or regulatory authorization.