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UNITED STATES DISTRICT COURT

CENTRAL DISTRICT OF CALIFORNIA

CHROMACODE, INC.,

Plaintiff,

v.

BIO-RAD LABORATORIES, INC.,

Defendant.

CASE NO.: _____

**COMPLAINT FOR PATENT INFRINGEMENT OF U.S. PATENT NOS. 10,068,051 AND 10,770,170**

DEMAND FOR JURY TRIAL

Plaintiff ChromaCode, Inc. ("Plaintiff" or "ChromaCode"), by and through their counsel, for their Complaint against Defendant Bio-Rad Laboratories, Inc. ("Bio-Rad" or "Defendant"), alleges as follows:

## NATURE OF THE ACTION

1. This is an action for infringement of U.S. Patent Nos. 10,068,051 (the "'051 Patent") and 10,770,170 (the "'170 Patent").

2. Traditional methods of detecting the presence or absence of multiple targets (called "multiplexing") in a biological sample require tagging every target with a different color—*i.e.*, target A is tagged with a "blue" signal, target B is tagged with a "red" signal, and so on. Although there may be an infinite number of unique colors in a rainbow, there are ***not*** an infinite number of colors that can be unambiguously ***detected*** by modern equipment. Accordingly, traditional assays were limited to only a few acceptable colors, which meant that only a small number of targets could be detected in a single test. ChromaCode's co-founder, Dr. Aditya Rajagopal, together with his colleagues at the California Institute of Technology ("Caltech"), figured out how to break the paradigm and unambiguously identify multiple targets using the same color tag. ChromaCode brings this action to stop Bio-Rad's infringement of this valuable and groundbreaking intellectual property. Bio-Rad markets and uses ChromaCode's exclusively licensed and patented multiplexing technologies in their digital Polymerase Chain Reaction ("PCR") products without authorization and in violation of ChromaCode's exclusive rights.

3. As a result of Bio-Rad's infringement, and given the threat of its growing infringement, ChromaCode will be irreparably harmed if such infringement is not halted.

## THE PARTIES

4. Plaintiff ChromaCode is a Delaware corporation with its headquarters

in Carlsbad, California. ChromaCode is a molecular diagnostics startup company with a diagnostic and bioinformatics focus.

5. Defendant Bio-Rad is a Delaware corporation headquartered in Hercules, California. Bio-Rad is a developer and manufacturer of specialized technological products for the life science research and clinical diagnostics markets. Bio-Rad's Quality Systems Development Division is based in Irvine, California.

## JURISDICTION AND VENUE

6. This Court has subject matter jurisdiction over this patent infringement action pursuant to 28 U.S.C. §§ 1331 and 1338(a).

7. This Court has personal jurisdiction over Bio-Rad because of Bio-Rad's purposeful, systematic, and continuous contacts with California, and particularly the Central District of California. Bio-Rad maintains regular and established places of business in this District at least at the following addresses: 9500 Jeronimo Road, Irvine, California 92618; 21 Technology Drive, Irvine, California 92618; and 9 Holland Drive, Irvine, California 92618. Bio-Rad's headquarters are located in Hercules, California. Bio-Rad is therefore physically located in the State of California. Bio-Rad conducts design, development, manufacturing, and distribution of software/informatics products and *in vitro* diagnostic medical devices for clinical laboratory quality control programs in Irvine, California (*i.e.*, in this District). Bio-Rad also sells products, including the Infringing Products (defined below), in Irvine, California, and elsewhere in the Central District of California.

8. Venue is proper in the Central District pursuant to 28 U.S.C. § 1400. The facts establishing this are included throughout this Complaint. Bio-Rad maintains regular and established places of business in this District, as identified above, and offers for sale and sells its infringing products in this District.

## BACKGROUND

9. The patented technology at issue in this case concerns the ability to detect, unambiguously, multiple targets in a single sample without having to label every target with a different color. This novel approach offers a fast and inexpensive alternative to researchers and clinicians who need unambiguous identification of multiple targets in a single sample.

### A. Traditional Methods of Identifying Multiple Targets in One Sample

10. For years, researchers invested substantial resources and time to overcome the single-target limitations of then-existing target identification systems. In an early improvement, researchers were able to modestly increase the number of targets unambiguously identified in a single sample by expanding the variety of colors used to tag targets. Probes designed to bind to particular targets were labeled with fluorophores which, when excited, emit light at different wavelengths (each of which correspond to a color range), and sensors tuned to detect those different wavelengths could then identify the presence or absence of each respective target. The probes were designed such that they would only emit light when a particular target was amplified. In other words, if a blue light probe designed to target A emits blue light, that means A is present in the sample. If no blue light is emitted, that means A is not present in the sample. If, in the same sample, a red light probe designed to target B emits red light, that means B is present in the sample. If no red light is emitted, that means B is not present in the sample. And so on. For every target, a different color could indicate its presence or absence.

11. Theoretically, with a one-target-one-color approach, one could unambiguously identify a nearly infinite number of targets in a single sample. For example, consider a target identification approach as indicated in the table below:

| Target | Assigned Shades of Blue |
|---|---|
| **A** | |
| **B** | |
| **C** | |

12. This table includes just three shades of blue for each target. The average human eye can detect up to around 10 million shades of different colors.[1] Unfortunately, fluorescent probes cannot be relied upon to emit light in any one particular shade with anywhere near this level of precision. Each fluorophore has a wide emission spectra, meaning they emit light in various shades of each color. Accordingly, in our example, rather than unambiguously identifying A from B from C, each shade of blue could correspond to each target, as shown below.

| Target | Assigned Shades of Blue |
|---|---|
| **A or B or C** | |
| **A or B or C** | |
| **A or B or C** | |

13. For this reason, to avoid what is called spectral overlap (bleeding colors) and preserve spectral resolution (the ability to detect different colors), only a relatively small number of colors (*e.g.*, 4 to 6) are typically used simultaneously in multiplexed fluorescent assays.

14. To overcome this limitation, researchers combined additional labor-intensive processing steps along with fluorescence to identify more targets from a single sample, including aliquoting, spatial arraying, and sequential processing. These additional processing steps are labor-intensive and frequently require relatively expensive and complex optical and mechanical systems. Although these tools offered some ability to increase the number of targets detected in a sample,

[1] *See* https://www.aao.org/eye-health/tips-prevention/how-humans-see-in-color.

there remained a significant need for inexpensive multiplexed encoding and decoding methods that could identify unambiguously a significantly higher number of targets.

**B. ChromaCode Broke the One-Target-One-Color Barrier**

15. Researchers continued to investigate a solution to the one-target-one-color approach. Then, in 2011, a team of researchers from Caltech, comprised of Drs. Emil Kartalov, Aditya Rajagopal, and Axel Scherer, conceived of a solution that enabled high definition multiplexing—specifically, the unambiguous identification of multiple targets for each color.

16. Dr. Emil Kartalov earned his B.S. in Physics (1998), M.S. in Applied Physics (2004), and Ph.D. in Applied Physics (2004), all from Caltech. His doctoral thesis focuses on single-molecule fluorescence microscopy, single-molecule DNA sequencing, and microfluidic DNA sequencing by synthesis. The first two developed techniques resulted in the founding of Helicos Biosciences in Boston, MA. For his postdoctoral work, Dr. Kartalov moved to the Biochemistry Dept and later the Pathology Department at the Keck School of Medicine at the University of Southern California ("USC"), where the focus shifted to fundamental microfluidics and biomedical applications of microfluidic devices. Dr. Kartalov invented microfluidic vias and resultant autoregulatory devices, and built multi-analyte microfluidic immunoassay chip for protein diagnostics in fingerprick amounts of human serum and plasma. In 2006, Dr. Kartalov won the NIH K99/R00 Career Award and became tenure-track faculty in Pathology at USC in 2008. His group focuses on microfluidic point-of-care diagnostics and techniques for high-throughput analysis of pathology tissue slices. Dr. Kartalov has over 33 peer-reviewed publications and 32 issued patents.[2]

[2] *See, e.g.*, https://nps.edu/web/physics/nps-physics-research-kartalov; *see also, e.g.*, https://presentations.akamaized.net/Shows/UBM/Standalone/IVDT/9-7-11/EmilBio.html; https://nps.edu/faculty-profiles/-/cv/epkartal.

17. Dr. Aditya Rajagopal earned his B.S. (2008), M.S. (2010), and Ph.D. (2013) in Electrical Engineering, all from Caltech. He is a Visiting Associate in Electrical Engineering at Caltech. Dr. Rajagopal's research in medical engineering, microfluidics, nanotechnology and bioengineering has resulted in numerous innovative technological developments. He is the inventor of core technologies related to not only multiplexed PCR assay design, but also combinatorics for biochemical labeling and algorithms for data processing. In the aggregate, Dr. Rajagopal has authored over 45 patents and patent publications. He is the recipient of numerous honors including the Caltech Grubstake Award in 2017, the Caltech Innovation Initiative (CI2) in 2014 and 2015, the Demitriadis-Kafka-Kokallis Thesis Prize in January 2013, and various fellowships and scholarships sponsored by the National Science Foundation and Carnation Foundation from 2006 to 2013. In addition to co-founding ChromaCode, Dr. Rajagopal co-founded a healthcare company called Esperto Medical—a venture-backed Caltech spin-out utilizing compressed sensing methods with ultrasound to continuously and non-invasively measure patient blood pressure.

18. Dr. Axel Scherer is the Bernard Neches Professor of Electrical Engineering, Physics, and Applied Physics at Caltech, where his research focuses on the design and microfabrication of optical, magnetic and fluidic devices. He is also a distinguished visiting professor at Thayer School of Engineering at Dartmouth College. He is known for fabricating the world's first semiconducting vertical-cavity surface-emitting laser ("VCSEL") at Bell Labs, now widely used in data communications systems. More recently, his group developed electromagnetic design tools and fabrication techniques for the definition of lithographically integrated optical devices. This led to pioneering work in photonic bandgap lasers, silicon photonic circuits, as well as tunable microfluidic dye lasers, leading to new classes of integrated optics. The first demonstration of strong coupling between single quantum dots and optical nanocavities recently

emerged from a collaboration between Dr. Scherer and Hyatt Gibbs. Collaborations with Larry Dalton (University of Washington) resulted in some of the world's smallest and fastest light modulators. Dr. Scherer also fabricated some of the first surface plasmon enhanced high brightness light emitting diodes. His group miniaturized fluidic systems and demonstrated the first multi-layer replication molded fluidic chips, with thousands of valves creating microfluidic "laboratories" and single cell analysis systems. He leads a group focused on the miniaturization and integration of fluidic, optical, electronic and magnetic devices for applications in biotechnology. Scherer has co-authored over 300 publications and holds over 100 patents on the area of microfabrication and design of devices.[3]

19. As a result of continued diligent research efforts, the Caltech researchers' high definition multiplexing solution was reduced to practice by at least February 3, 2012, when Caltech filed U.S. Provisional Patent Application No. 61/594,480, to which the '051 and '170 Patents claim priority.

20. The Caltech researchers' innovative approach to high definition multiplexing, referred to as both high-definition PCR[4] ("HDPCR"), involves using multiple fluorescent probes in a single reaction, each probe corresponding to a

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[3] *See, e.g.*, https://www.eas.caltech.edu/people/etcher#profile-d0b3cee6-tab; *see also, e.g.*, https://www.eas.caltech.edu/people/etcher#publications-d0b3cee6-tab; https://feeds.library.caltech.edu/people/Scherer-A/.

[4] "PCR" stands for the Polymerase Chain Reaction, which is a method of exponential amplification of specific target DNA in a reaction mix with a DNA polymerase and primers. Primers are short single-stranded DNA oligonucleotides, which bind to particular regions of a target sequence. The reaction mixture is cycled in heating and cooling steps. The heating cycle denatures or splits the double-stranded DNA target into single-stranded templates. In the cooling cycle, the primers bind to the target. After the template is primed, the DNA polymerase creates a copy of the original template. Repeated cycling exponentially amplifies the target 2 fold with each cycle leading to approximately a billion-fold increase of the target sequence in 30 cycles.

different target but not necessarily a different color, and distinguishing targets unambiguously based on cumulative signal intensities from each fluorophore. HDPCR is the subject of multiple U.S. patents assigned to Caltech, including the '051 and '170 Patents (collectively, the "HDPCR Patents").

**C. The Founding and Mission of ChromaCode**

21. In 2012, Dr. Aditya Rajagopal teamed up with Dr. Alex Dickinson to found ChromaCode in order to bring the patented HDPCR technology to the market. Drs. Rajagopal and Dickinson understood that the commercialization of multiplexing technologies, like HDPCR, was critical to the creation of widely-available, efficient and affordable PCR assays able to detect various diseases and medical conditions. ChromaCode obtained an exclusive license to the HDPCR Patents from Caltech for the purpose of developing and delivering commercial embodiments of the HDPCR technology to the market. ChromaCode sought to bridge the gap where one-target-one-color multiplexing falls short because it is not comprehensive enough and next generation sequencing ("NGS") falls short because it can be too slow, costly, and require too much tissue. ChromaCode knew that its HDPCR multiplexing technology could deliver results to patients faster, require less painful procedures, and cost significantly less.

22. ChromaCode's market strategy was to be first-to-market with its groundbreaking HDPCR technology, either through its own commercialization efforts or a partnership with an existing multi-color digital PCR ("dPCR") company. Because ChromaCode's first-to-market strategy was protected by its exclusive patent rights, several third parties invested millions of dollars in ChromaCode. Indeed, ChromaCode's value is inextricably tied to its ability to execute on its first-to-market strategy.

23. ChromaCode's exclusive intellectual property rights in the HDPCR Patents provide ChromaCode with a valuable competitive shield against much larger multi-billion-dollar competitors like Bio-Rad. Bio-Rad's infringement of

the HDPCR Patents has eroded that shield and severely diminished ChromaCode's economic advantage.

24. The global PCR market is immense. In the United States alone, the PCR market was estimated to be $7.10 billion in 2020.[5] The market only continues to grow. The increase in PCR research and forensic laboratories and increasing demand for advanced diagnostics, which depend on the ability to detect multiple target sequences in single PCR reactions, are expected to drive market growth. Among other things, the increase in the prevalence of chronic and infectious diseases and genetic disorders is expected to boost PCR demand.

25. Thus, ChromaCode's market value will be irreparably harmed if Bio-Rad is not enjoined from selling its infringing products. ChromaCode's primary asset is its intellectual property. If Bio-Rad is allowed to infringe the HDPCR Patents, ChromaCode's market value will be irreparably reduced. Even if ChromaCode recovers money damages from Bio-Rad, its market value will not be repaired.

## THE ASSERTED PATENTS

### A. The HDPCR Patents

26. On September 4, 2018, the USPTO issued the '051 Patent, entitled "Signal Encoding and Decoding in Multiplexed Biochemical Assays," to Drs. Emil Kartalov, Aditya Rajagopal and Axel Scherer. Caltech is the assignee of the '051 Patent. ChromaCode is the exclusive licensee of the '051 Patent pursuant to a license agreement with Caltech dated June 8, 2015. A true and correct copy of the '051 Patent is attached hereto as **Exhibit A**.

27. The '051 Patent claims priority to U.S. Provisional Application No. 61/594,480, filed on February 3, 2012. Independent claim 1 of the '051 Patent

[5] *See* https://www.fortunebusinessinsights.com/polymerase-chain-reaction-pcr-market-102528.

recites:

> 1. A method of detecting the presence or absence of at least seven polynucleotide analytes, in any combination of presence or absence, in a single sample solution volume, the method comprising:
>
> a) providing a sample solution volume comprising or potentially comprising, at least one of at least seven polynucleotide analytes, and comprising at least seven hybridization probes, each hybridization probe corresponding to one of the at least seven polynucleotide analytes, wherein each hybridization probe comprises at least one fluorophore selected from four fluorophores, and wherein each hybridization probe, when excited and when contacted with its corresponding polynucleotide analyte, generates a cumulative intensity signal, further wherein each generated cumulative intensity signal comprises at least one signal generated by excitement of at least one of the four fluorophores;
>
> b) contacting said sample solution volume with the plurality of hybridization probes and exciting the hybridization probes to generate the cumulative intensity signal(s) if one or more of the at least seven polynucleotide analytes is present in the sample volume; and
>
> c) measuring the cumulative intensity signal(s), thereby generating a cumulative signal measurement, wherein the cumulative signal measurement non-degenerately indicates the presence or absence of the at least seven polynucleotide analytes, in any combination of presence or absence,
>
> wherein said method non-degenerately detects the presence or absence of the at least seven polynucleotide analytes in said single sample solution volume, in any combination of presence or absence, without requiring any step of immobilization of said polynucleotide

analytes, physical separation of said polynucleotide analytes, or mass spectrometry.

28. On September 4, 2018, the USPTO issued the '170 Patent, entitled "Signal Encoding and Decoding in Multiplexed Biochemical Assays," to Drs. Emil Kartalov, Aditya Rajagopal and Axel Scherer. Caltech is the assignee of the '170 Patent. ChromaCode is the exclusive licensee of the '170 Patent pursuant to a license agreement with Caltech dated June 8, 2015. A true and correct copy of the '170 Patent is attached hereto as **Exhibit B**.

29. The '170 Patent shares the same specification as the '051 Patent and claims priority to U.S. Provisional Application No. 61/594,480, filed on February 3, 2012. Independent claim 1 of the '170 Patent recites:

> 1. A method of unambiguously detecting any unique combination of presence or absence of at least five polynucleotide analytes in a plurality of droplets, the method comprising:
>
> a) providing a sample comprising, or potentially comprising, at least one of said at least five polynucleotide analytes;
>
> b) forming a mixture of said sample and at least five hybridization probes, wherein each of said at least five hybridization probes further comprises at least one fluorophore and at most four fluorophores;
>
> c) partitioning said mixture into said plurality of droplets;
>
> d) exciting said at least one fluorophore to generate one or more signals if one or more of said at least five polynucleotide analytes is present in said plurality of droplets, wherein said one or more signals comprise at least one signal generated by excitement of said at least one fluorophore;
>
> e) measuring said one or more signals to generate a cumulative intensity measurement, wherein said cumulative intensity measurement corresponds to the

presence of a unique combination of presence or absence of said at least five polynucleotide analytes in said sample; and

f) determining whether each of said least five polynucleotide analytes is present, in any unique combination of presence or absence, based on said cumulative intensity measurement,

wherein the method does not require any step of immobilization of said at least five polynucleotide analytes or mass spectrometry.

30. The HDPCR Patents describe a method of unambiguously identifying more than one target per color by using a cumulative signal from all fluorescent probes in a reaction. By designing the assay so that each cumulative signal can ***only*** belong to one target—notwithstanding the fact that multiple targets may be assigned the same color—the HDPCR Patents describe a method of doing what others could not: unambiguously identifying multiple targets in a single sample by using less colors than targets.

31. The HDPCR Patents provide solutions to the long-existing problem of how to unambiguously identify multiple targets without expanding the colors used, and in some cases, how to unambiguously identify at least five or more targets in less than the same number of colors (*e.g.*, five targets with four colors or less). ChromaCode's exclusively licensed and patented multiplexing solution dramatically improved on existing dPCR technology and opened the door to providing usable and commercially viable advanced PCR detection assays that could aid in the fight against difficult diseases like cancer.

## THE INFRINGING PRODUCTS

### A. Bio-Rad Launches its Infringing QX600 Droplet Digital PCR System

32. Upon information and belief, Bio-Rad also had been trying to develop

an advanced multiplexing technology of its own. In 2011, Bio-Rad researchers allegedly figured out a process of identifying more targets than colors in a single sample and filed for patent protection of their process. *See* U.S. Provisional Patent Application No. 61/454,373, filed on March 18, 2011. Although Bio-Rad received patents on their approach to multiplexing, *see* U.S. Patent Nos. 9,222,128 and 9,921,154, Bio-Rad was unable to unambiguously detect multiple targets per color or unambiguously detect more than four targets with two colors. Despite many years trying to make its own inferior multiplexing technology work, this limitation rendered Bio-Rad's approach commercially unviable.

33. Bio-Rad knew, however, that ChromaCode had been able to develop an elegant, functional multiplexing solution to unambiguously detect multiple targets per color. ChromaCode shared an overview of its patented, proprietary technology with Bio-Rad during fundraising discussions in 2014. These fundraising discussions included an overview of ChromaCode's intellectual property portfolio, including then-pending Caltech patent applications covering the HDPCR multiplexing technology. ChromaCode shared with Bio-Rad that it was the exclusive licensee to these patents.

34. The application that became the '051 Patent published on February 26, 2015. The '051 Patent issued on September 4, 2018. Around this period, discussions with Bio-Rad continued. In those discussions with Bio-Rad, ChromaCode reiterated that it had the exclusive rights to patented HDPCR multiplexing technology. Indeed, in 2017 and 2018, ChromaCode shared slides with Bio-Rad stating that, in its multiplexing assay, "[t]argets are amplitude multiplexed using ChromaCode's patented and proprietary methods." The slides ChromaCode shared with Bio-Rad also referred to ChromaCode's "[p]atented multiplex coding methods," and stated that ChromaCode had "[e]xclusive rights to patented HDPCR™ from Caltech." On information and belief, armed with this knowledge, a sophisticated legal department, and significant prior experience with

patent disputes and patent litigation, Bio-Rad should have investigated the scope of ChromaCode's patent rights, including the '051 and '170 Patents.

35. Unable to make its own approach commercially viable, Bio-Rad decided instead to copy ChromaCode's multiplexing solution and willfully infringe the HDPCR Patents. In late 2022, Bio-Rad announced its new QX600 Droplet Digital PCR System (the "QX600 System").[6] For example, in an April 5, 2023 press release, Bio-Rad touted that its QX600 System is capable of unambiguously identifying 12 targets in its 6 color instrument:

> Bio-Rad Laboratories, Inc. (NYSE: BIO and BIOb), a global leader in life science research and clinical diagnostic products, is accelerating measurable residual disease (MRD) research through more than a half dozen collaborations with institutions and companies leveraging its new QX600™ Droplet Digital™ PCR System. ***Launched late last year, it boasts six color detection capable of quantifying 12 targets per well***, a simple user workflow, and powerful data analysis. Maintaining Bio-Rad's best-in-class ddPCR™ technology, this platform utilizes the same droplet generation and processing protocols as the QX200™ system, enabling thousands of current customers to easily adopt its advanced multiplexing capabilities.[7]

A true and correct copy of Bio-Rad's April 5, 2023 press release, which is attached hereto as **Exhibit C**.[8]

36. Beginning at least as of December 14, 2022, Bio-Rad's website

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[6] As used herein, the term "QX600 System" includes Bio-Rad's QX600 Droplet Digital PCR System and related systems, components and assays, such as Bio-Rad's QX600 Auto DG Droplet Digital System.

[7] Emphasis added.

[8] *See also* https://www.bio-rad.com/en-us/life-science-research/news/bio-rads-qx600-droplet-digital-pcr-system-advancing-measurable-residual-disease-research?ID=Bio-Rad-s-QX600-Drop_1680646933.

offered the QX600 System for sale, announcing: "The QX600™ Droplet Digital™ PCR System enables advanced six-color multiplexing, allowing clear discrimination of multiple targets with assays that are cross-compatible with the QX200™ Droplet Digital PCR System. The QX600 System is designed for researchers who need to quantify multiple targets with high accuracy, reproducibility, and sensitivity." A true and correct copy of the product page for the QX600 system is attached hereto as **Exhibit D**.[9] The QX600 System product page continues in the "Description" section:

> The QX600 Droplet Reader offers users:
>
> - Sensitive multiplexing
>  - Six-color detection capability (FAM, HEX, Cy5, Cy5.5, ROX, and ATTO 590)
>  - Quantification of up to 12 targets in a single well
>  - Absolute quantification with 0.1% or better sensitivity
>  - Sensitive and precise gene expression multiplexing

37. Bio-Rad also began distributing instructions on how to use the QX600 System and related assays to multiplex PCR processes to customers throughout the United States, including in this District, on its website, including the QX600 Droplet Reader and QX Manager Software Standard Edition User Guide (the "QX600 System User Guide"). A true and correct copy of the QX600 System User Guide is attached hereto as **Exhibit E**.[10]

38. The QX600 System User Guide describes multiple assays for the QX600 that include an encoding scheme based on the cumulative signal from each

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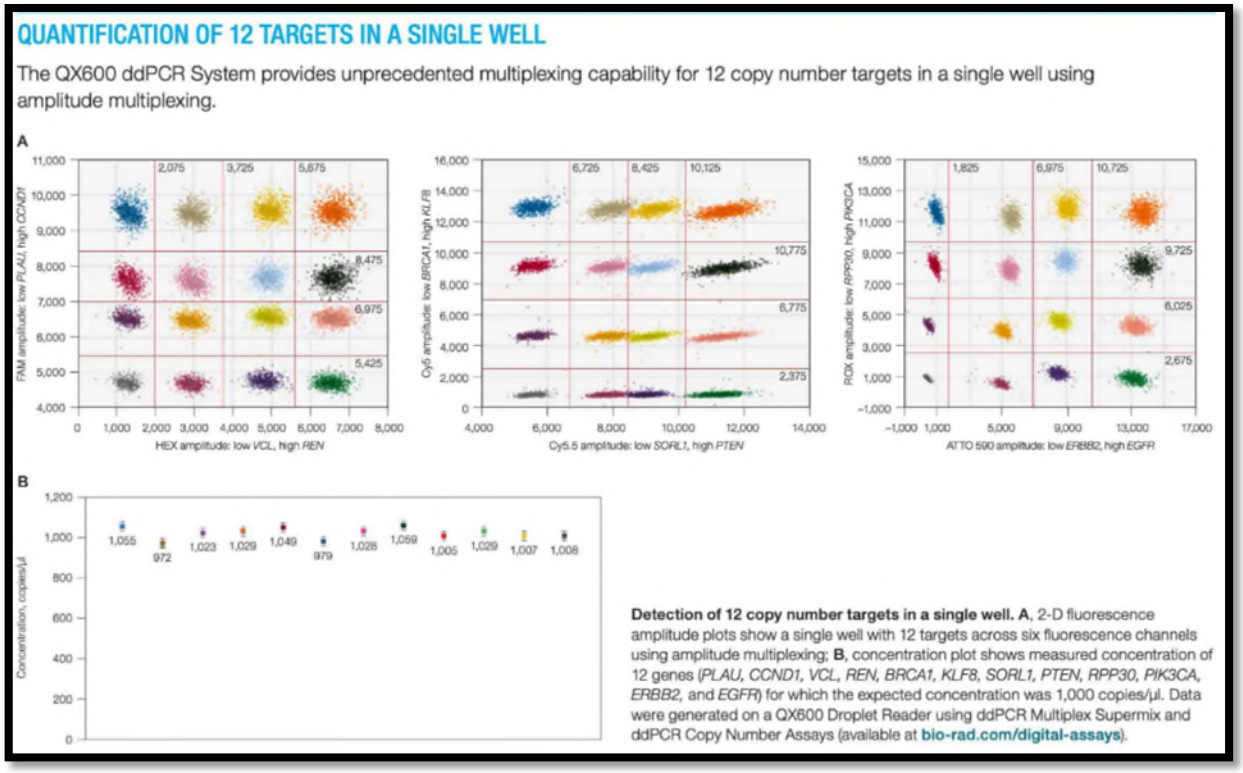
[9] *See also* https://www.bio-rad.com/en-us/product/qx600-droplet-digital-pcr-system?ID=b07d12ac-0585-fc4c-a586-3ddf20d5c4a0.

[10] *See also* https://www.bio-rad.com/sites/default/files/2022-12/10000153877.pdf.

fluorophore information that unambiguously identifies more targets than there are colors. For example, in Table 15 titled "Assay types," Bio-Rad describes assay type "Amplitude multiplex" as "Method to increase multiplexing up to twelve targets per well, with one or two targets detected per [color]." Ex. E at 77. Bio-Rad also describes a "Method assuming up to six probe colors … and up to six targets per [color]." *Id.*; *see also id.* at 79, Table 21 (describing "Fluorophore options" including "Amplitude multiplex, for 1 to 12 targets" and "Probe mix triplex, for 9 targets").

39. In Bio-Rad's "Bulletin 3557," a true and correct copy of which is attached hereto as **Exhibit F**,[11] Bio-Rad provided data demonstrating their new and "unprecedented multiplexing capabilit[ies]," as reflected in the excerpt below labeled "Quantification of 12 Targets in a Single Well."

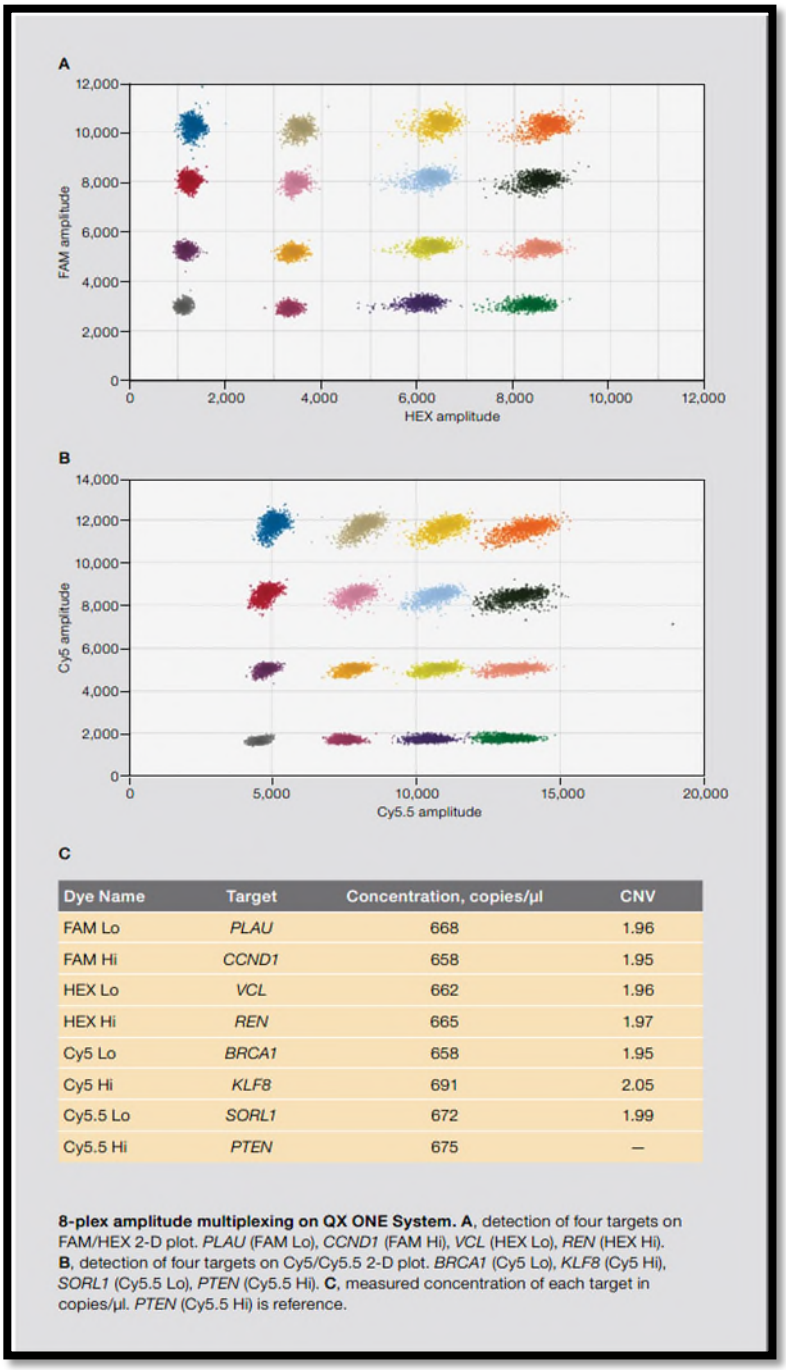



40. At least the QX600 System practices one or more claims of each of

[11] *See also* https://www.bio-rad.com/sites/default/files/2023-08/Bulletin_3557.pdf.

the HDPCR Patents. For example, the QX600 System's ability to detect multiple targets per color using cumulative signals is only possible using ChromaCode's patented approach to multiplexing recited by one or more claims of each of the HDPCR Patents. Thus, Bio-Rad's QX600 System infringes the HDPCR Patents.

41. Bio-Rad's QX ONE Droplet Digital PCR System and ddPCR Multiplex Supermix together also practice one or more claims of each of the




C

| Dye Name | Target | Concentration, copies/µl | CNV |
|---|---|---|---|
| FAM Lo | *PLAU* | 668 | 1.96 |
| FAM Hi | *CCND1* | 658 | 1.95 |
| HEX Lo | *VCL* | 662 | 1.96 |
| HEX Hi | *REN* | 665 | 1.97 |
| Cy5 Lo | *BRCA1* | 658 | 1.95 |
| Cy5 Hi | *KLF8* | 691 | 2.05 |
| Cy5.5 Lo | *SORL1* | 672 | 1.99 |
| Cy5.5 Hi | *PTEN* | 675 | – |

**8-plex amplitude multiplexing on QX ONE System. A**, detection of four targets on FAM/HEX 2-D plot. *PLAU* (FAM Lo), *CCND1* (FAM Hi), *VCL* (HEX Lo), *REN* (HEX Hi). **B**, detection of four targets on Cy5/Cy5.5 2-D plot. *BRCA1* (Cy5 Lo), *KLF8* (Cy5 Hi), *SORL1* (Cy5.5 Lo), *PTEN* (Cy5.5 Hi). **C**, measured concentration of each target in copies/µl. *PTEN* (Cy5.5 Hi) is reference.

HDPCR Patents, as reflected in Bio-Rad's "Bulletin 6512."[12] A true and correct copy of Bulletin 6512 is attached hereto as **Exhibit G** and an excerpt from that Bulletin is included above for the Court's convenience.

42. Bulletin 6512 states: "Bio-Rad's QX ONE Droplet Digital PCR System offers four color channels—FAM, HEX, Cy5, and Cy5.5—thereby providing additional multiplexing flexibility. By using Bio-Rad's ddPCR Multiplex Supermix on the QX ONE ddPCR System, as many as eight targets can be detected and measured in a single reaction. Such advanced multiplexing is made possible using strategies such as amplitude multiplexing in conjunction with four color channels. Extract as much information as possible with high sensitivity, using as little sample as possible in a fast, cost-effective manner." Ex. G at 9.

43. Bio-Rad knew or should have known about ChromaCode's exclusive rights to practice the HDPCR Patents. Despite knowledge of ChromaCode's patent rights, Bio-Rad chose not only to infringe, but to induce others to do so as well. Indeed, as described above, Bio-Rad went so far as to provide step-by-step instructions on how to use Bio-Rad's devices to infringe the HDPCR Patents. This egregious misconduct has caused ChromaCode significant, irreparable harm that will continue unless and until Bio-Rad is enjoined from infringing the HDPCR Patents.

## COUNT I

## INFRINGEMENT OF THE '051 PATENT

44. Plaintiff repeats and realleges each and every allegation contained in the preceding paragraphs of this Complaint as if fully set forth herein.

45. ChromaCode is the exclusive licensee of the '051 Patent. ChromaCode's exclusive rights include the right to enforce the '051 Patent.

[12] *See* https://www.bio-rad.com/webroot/web/pdf/lsr/literature/Bulletin_6512.pdf.

46. Bio-Rad makes, offers to sell and/or sells its infringing products in the United States, including in this District.

47. For example, Bio-Rad's QX600 System practices each and every limitation, either literally or under the doctrine of equivalents, of at least claim 1 of the '051 Patent in violation of 35 U.S.C. § 271(a). For example, one or more assays provided by Bio-Rad with at least the QX600 System perform amplitude-based PCR multiplexing to unambiguously identify the presence or absence of at least seven polynucleotide analytes based on cumulative signal intensity of probes that comprise at least one fluorophore selected from four fluorophores, and perform each of the other elements of claim 1. Bio-Rad's QX600 System, therefore, directly infringes the '051 Patent.

48. Bio-Rad also indirectly infringes the '051 Patent. Bio-Rad has knowingly induced infringement of the '051 Patent by encouraging others to infringe at least claim 1 of the '051 Patent. For example, in Bio-Rad's QX600 System User Guide, Bio-Rad has induced, and will continue to induce, users to infringe the '051 Patent by expressly and intentionally instructing and encouraging users to perform each limitation of at least claim 1 of the '051 Patent in violation of 35 U.S.C. § 271(b). Bio-Rad is, therefore, liable for inducing infringement of the '051 Patent.

49. Bio-Rad's sale of infringing products has contributed, and will continue to contribute, to the infringement of the '051 Patent in violation of 35 U.S.C. § 271(c). For example, users of the QX600 System have infringed, and will continue to infringe, at least claim 1 of the '051 Patent by performing assays in accordance with instructions set forth in the QX600 System User Guide. Bio-Rad is, therefore, liable for contributing to the infringement of the '051 Patent.

50. Upon information and belief, Bio-Rad had and continues to have knowledge that multiple assays it provides for the QX600 System are especially made or especially adapted for a use that infringes the '051 Patent.

51. Upon information and belief, Bio-Rad had actual and constructive notice of the ’051 Patent prior to launching the QX600 System and knowingly or intentionally infringed the ’051 Patent after acquiring that knowledge. Bio-Rad has no reasonable basis for asserting that the commercial manufacture, use, offer for sale, or sale of the QX600 System will not infringe, induce the infringement of, and/or contribute to the infringement of the ’051 Patent.

52. Bio-Rad’s infringement of the ’051 Patent has been, and continues to be, willful, wanton, malicious, bad faith, deliberate, consciously wrong, flagrant, and egregious, entitling Plaintiff to an award of up to three times its actual damages pursuant to 35 U.S.C. § 284.

53. Bio-Rad’s willful infringement of the ’051 Patent further renders this an exceptional case under 35 U.S.C. § 285.

54. ChromaCode has been damaged by Bio-Rad’s egregious and willful infringement of the ’051 Patent.

55. ChromaCode will be irreparably harmed if Bio-Rad is not enjoined from infringing, and from actively inducing or contributing to the infringement of, the ’051 Patent. Plaintiff does not have an adequate remedy at law and, considering the balance of hardships between ChromaCode and Bio-Rad, a remedy in equity is warranted. Further, the public interest would not be disserved by the entry of a permanent injunction.

## COUNT II

## INFRINGEMENT OF THE ’170 PATENT

56. Plaintiff repeats and realleges each and every allegation contained in the preceding paragraphs of this Complaint as if fully set forth herein.

57. ChromaCode is the exclusive licensee of the ’170 Patent. ChromaCode’s exclusive rights include the right to enforce the ’170 Patent.

58. Bio-Rad makes, offers to sell and/or sells its infringing products in the United States, including in this District.

59. For example, Bio-Rad's QX600 System practices each and every limitation, either literally or under the doctrine of equivalents, of at least claim 1 of the '170 Patent in violation of 35 U.S.C. § 271(a). For example, one or more assays provided by Bio-Rad with at least the QX600 System perform amplitude-based PCR multiplexing to unambiguously identify the presence or absence of at least five polynucleotide analytes based on cumulative signal intensity of probes that comprise between one and four fluorophores, and perform each of the other elements of claim 1. Bio-Rad's QX600 System, therefore, directly infringes the '170 Patent.

60. Bio-Rad also indirectly infringes the '170 Patent. Bio-Rad has knowingly induced infringement of the '170 Patent by encouraging others to infringe at least claim 1 of the '170 Patent. For example, in Bio-Rad's QX600 System User Guide, Bio-Rad has induced, and will continue to induce, users to infringe the '170 Patent by expressly and intentionally instructing and encouraging users to perform each limitation of at least claim 1 of the '170 Patent in violation of 35 U.S.C. § 271(b). Bio-Rad is, therefore, liable for inducing infringement of the '170 Patent.

61. Bio-Rad's sale of the infringing products has contributed, and will continue to contribute, to the infringement of the '170 Patent in violation of 35 U.S.C. § 271(c). For example, users of the QX600 System have infringed, and will continue to infringe, at least claim 1 of the '170 Patent by performing assays in accordance with instructions set forth in the QX600 System User Guide. Bio-Rad is, therefore, liable for contributing to the infringement of the '170 Patent.

62. Upon information and belief, Bio-Rad had and continues to have knowledge that multiple assays it provides for the QX600 System are especially made or especially adapted for a use that infringes the '170 Patent.

63. Upon information and belief, Bio-Rad had actual and constructive notice of the '170 Patent prior to launching the QX600 System and knowingly or

intentionally infringed the '170 Patent after acquiring that knowledge. Bio-Rad has no reasonable basis for asserting that the commercial manufacture, use, offer for sale, or sale of the QX600 System will not infringe, contribute to the infringement of, and/or induce the infringement of the '170 Patent.

64. Bio-Rad's infringement of the '170 Patent has been, and continues to be, willful, wanton, malicious, bad faith, deliberate, consciously wrong, flagrant, and egregious, entitling Plaintiff to an award of up to three times its actual damages pursuant to 35 U.S.C. § 284.

65. Bio-Rad's willful infringement of the '170 Patent further renders this an exceptional case under 35 U.S.C. § 285.

66. ChromaCode has been damaged by Bio-Rad's egregious and willful infringement of the '170 Patent.

67. ChromaCode will be irreparably harmed if Bio-Rad is not enjoined from infringing, and from actively inducing or contributing to the infringement of the '170 Patent. ChromaCode does not have an adequate remedy at law, and, considering the balance of hardships between ChromaCode and Bio-Rad, a remedy in equity is warranted. Further, the public interest would not be disserved by the entry of a permanent injunction.

## PRAYER FOR RELIEF

68. WHEREFORE, Plaintiff respectfully requests the following relief:

a. That the Court enter judgment that Bio-Rad directly infringed (literally and/or under the doctrine of equivalents), contributorily infringed, and induced infringement of the '051 Patent;

b. That the Court enter judgment that Bio-Rad directly infringed (literally and/or under the doctrine of equivalents), contributorily infringed, and induced infringement of the '170 Patent;

c. That, prior to the expiration of the HDPCR Patents, the Court enjoin Bio-Rad from: (1) making, offering for sale and selling its infringing products and related multiplexing assays, and (2) infringing the HDPCR Patents;

d. That the Court award Plaintiff monetary damages suffered as a result of Bio-Rad's infringement of the '051 and '170 Patents;

e. That an accounting be performed to determine the monetary damages to be awarded to Plaintiff as a result of Bio-Rad's infringing activities, including an accounting for infringing conduct not presented at trial and an award of additional damages for any such infringing activities;

f. That the Court find that Bio-Rad's infringement of the HDPCR Patents was egregious and willful and award Plaintiff three times its actual damages;

g. That the Court declare that this case is exceptional under 35 U.S.C. § 285 and award Plaintiff its attorneys' fees, costs, and expenses incurred in this action;

h. That the Court award Plaintiff any further and additional relief as the Court may deem just, equitable, and proper.

**JURY DEMAND**

Plaintiff hereby demands a jury trial on all issues and claims so triable.

Dated: October 5, 2023

WILSON SONSINI GOODRICH & ROSATI, PC

Amy H. Candido

Amy H. Candido

*Attorneys for Plaintiff ChromaCode, Inc.*