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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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*Ex parte* ROBERT L. MORITZ, SAMUEL BADER, and  
ULRIKE KUSEBAUCH

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Appeal 2020-004626<sup>1</sup>  
Application 15/202,378  
Technology Center 1600

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Before FRANCISCO C. PRATS, TAWEN CHANG, and  
CYNTHIA M. HARDMAN, *Administrative Patent Judges*.

HARDMAN, *Administrative Patent Judge*.

DECISION ON APPEAL

This is an appeal under 35 U.S.C. § 134(a) involving claims to a multiplexed method to identify proteins to which a test compound binds, which have been rejected as being directed to patent-ineligible subject matter. We have jurisdiction under 35 U.S.C. § 6(b).

We REVERSE.

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<sup>1</sup> We use the word “Appellant” to refer to “applicant” as defined in 37 C.F.R. § 1.42. Appellant identifies Institute for Systems Biology as the real party in interest. Appeal Br. 2.

### CLAIMED SUBJECT MATTER

Claims 1–4 and 13–18 are on appeal. Final Act. 2. Claim 1 is illustrative and reads as follows:

1. A multiplexed method to identify proteins to which a test compound binds in a sample containing numerous proteins or for identifying a compound capable of binding to a target protein contained in a sample comprising numerous proteins, including said target protein, which method comprises:

(a) subjecting a first portion of the sample that contains test compound and a second portion of the sample that does not contain test compound to at least one temperature at which at least some of the proteins in said sample are more soluble when bound to the test compound and less soluble when not bound to said test compound;

(b) separating each of said first and second portions to obtain a soluble fraction and an insoluble fraction of each;

(c) determining the concentration of a multiplicity of proteins in either the soluble fraction or the insoluble fraction of each portion or both;

wherein said determining is performed in an unbiased manner by Sequential Windowed data independent Acquisition of the Total High resolution Mass Spectroscopy (SWATH-MS);  
or

wherein said determining is performed in a biased manner by Selected Reaction Monitoring (SRM-MS);

wherein a protein whose concentration in the soluble fraction of the first portion is increased at said temperature as compared to the soluble fraction of the second portion and/or whose concentration in the insoluble fraction of the first portion is decreased at said temperature as compared to the insoluble fraction of the second portion is identified as a protein that binds said test compound, or

wherein a higher concentration of said target protein in the soluble fraction of the first portion at said temperature as compared to the soluble fraction of the second portion and/or a

lower concentration of target protein in the insoluble fraction in the first portion at said temperature as compared to the insoluble fraction of the second portion identifies said test compound as binding the target protein.

Appeal Br. 8 (Claims Appendix).

## REJECTION

Claims 1–4 and 13–18 stand rejected under 35 U.S.C. § 101 as being directed to patent-ineligible subject matter. Final Act. 3.

## DISCUSSION

The Examiner found that the claims are directed to a method for identifying proteins to which a test compounds binds, where the claims “recite a series of abstract data analysis . . . steps (concentration determinations) to be performed on Mass Spectroscopy data so as to identify[] the binding properties of a test compound to an arbitrary protein of interest.” Final Act. 3. The Examiner found that a method “directed essentially to a series of algorithmic/mathematical procedures is not a statutory process.” *Id.* at 4. The Examiner additionally found that the claimed steps of determining whether a protein concentration is increased or decreased and identifying a test compound as one that binds to a target are mental steps. Ans. 4.

The Examiner acknowledged that the claims “recite additional elements beyond the judicial exception,” but found that they “do no indicate an improvement to either the sample or testing methods themselves,” but rather “only turn to known SWATH-MS or SRM-MS analysis procedures to generate the requisite sample data for analysis.” Final Act. 4. The Examiner also found that the additional steps are “data gathering required to practice

the judicial exception and thus do not amount to a real-world integration of the judicial exceptions.” Ans. 5. The Examiner additionally found that “[t]he information arrived at (whether a protein can bind) is not used in any practical manner which amount[s to] a meaningful limitation of that information.” *Id.*

Appellant argues that claimed steps (a) through (c) describe a prior art method for determining interaction of a test compound with a single protein, and that “the invention itself is directed to an improvement which permits multiplexing” of this prior art method.<sup>2</sup> Appeal Br. 4. Appellant asserts the claimed improvement lies in “requiring that the sample comprise numerous proteins and requiring that the determining is performed by SWATH-MS or SRM-MS.” *Id.* at 3. Appellant argues that this is “a new method for determining protein/compound interactions,” and thus “improv[es] a technological process.” *Id.* at 5, 6; *see also* Reply Br. 3 (“[T]he claims recite an improvement to the technical field described, for example, in the ’014 patent.”).

Appellant additionally argues that the Examiner “nowhere considers the claims as a whole,” but “when considered as a whole, the claims are directed to an improvement in determining test compound interaction with proteins and thus integrate the alleged judicial exception into a practical application.” Reply Br. 4. Appellant further argues that the Specification “explains the improvement and its benefit.” *Id.* at 7–8 (citing Spec. ¶¶ 3–6, 8–11, and Example 1).

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<sup>2</sup> Appellant indicates that the prior art method is claimed in US Patent 8,969,014 (“the ’014 patent”). Appeal Br. 3.

*Principles of Law*

*1. Section 101*

An invention is patent-eligible if it claims a “new and useful process, machine, manufacture, or composition of matter.” 35 U.S.C. § 101. However, the U.S. Supreme Court has long interpreted 35 U.S.C. § 101 to include implicit exceptions: “[l]aws of nature, natural phenomena, and abstract ideas” are not patentable. *E.g., Alice Corp. v. CLS Bank Int’l*, 573 U.S. 208, 216 (2014).

In determining whether a claim falls within an excluded category, we are guided by the Court’s two-part framework, described in *Mayo* and *Alice*. *Id.* at 217–18; *Mayo Collaborative Servs. v. Prometheus Labs., Inc.*, 566 U.S. 66, 75–77 (2012). In accordance with that framework, we first determine what concept the claim is “directed to.” *Alice*, 573 U.S. at 219 (“On their face, the claims before us are drawn to the concept of intermediated settlement, *i.e.*, the use of a third party to mitigate settlement risk.”); *see also Bilski v. Kappos*, 561 U.S. 593, 611 (2010) (“Claims 1 and 4 in petitioners’ application explain the basic concept of hedging, or protecting against risk.”).

Concepts determined to be abstract ideas, and thus patent ineligible, include certain methods of organizing human activity, such as fundamental economic practices (*Alice*, 573 U.S. at 219–20; *Bilski*, 561 U.S. at 611); mathematical formulas (*Parker v. Flook*, 437 U.S. 584, 594–95 (1978)); and mental processes (*Gottschalk v. Benson*, 409 U.S. 63, 67 (1972)). Concepts determined to be patent eligible include physical and chemical processes, such as “molding rubber products” (*Diamond v. Diehr*, 450 U.S. 175, 191 (1981)); “tanning, dyeing, making water-proof cloth, vulcanizing India

rubber, smelting ores” (*id.* at 182 n.7 (quoting *Corning v. Burden*, 56 U.S. 252, 267–68 (1854))); and manufacturing flour (*Benson*, 409 U.S. at 69 (citing *Cochrane v. Deener*, 94 U.S. 780, 785 (1876))).

In *Diehr*, the claim at issue recited a mathematical formula, but the Court held that “a claim drawn to subject matter otherwise statutory does not become nonstatutory simply because it uses a mathematical formula.” *Diehr*, 450 U.S. at 187; *see also id.* at 191 (“We view respondents’ claims as nothing more than a process for molding rubber products and not as an attempt to patent a mathematical formula.”). Having said that, the Court also indicated that a claim “seeking patent protection for that formula in the abstract . . . is not accorded the protection of our patent laws, and this principle cannot be circumvented by attempting to limit the use of the formula to a particular technological environment.” *Id.* (citation omitted) (citing *Benson* and *Flook*); *see, e.g., id.* at 187 (“It is now commonplace that an *application* of a law of nature or mathematical formula to a known structure or process may well be deserving of patent protection.”).

If a claim is “directed to” an abstract idea, we turn to the second step of the *Alice* and *Mayo* framework, where “we must examine the elements of the claim to determine whether it contains an ‘inventive concept’ sufficient to ‘transform’ the claimed abstract idea into a patent-eligible application.” *Alice*, 573 U.S. at 221 (internal quotation marks omitted). “A claim that recites an abstract idea must include ‘additional features’ to ensure ‘that the [claim] is more than a drafting effort designed to monopolize the [abstract idea].’” *Id.* (alterations in original) (quoting *Mayo*, 566 U.S. at 77). “[M]erely requir[ing] generic computer implementation[] fail[s] to transform that abstract idea into a patent-eligible invention.” *Id.*

## 2. USPTO Section 101 Guidance

In January 2019, the U.S. Patent and Trademark Office (“USPTO”) published revised guidance on the application of § 101. 2019 Revised Patent Subject Matter Eligibility Guidance, 84 Fed. Reg. 50 (Jan. 7, 2019) (“Guidance”).<sup>3</sup> “All USPTO personnel are, as a matter of internal agency management, expected to follow the guidance.” *Id.* at 51; *see also* October 2019 Update at 1.

Under the Guidance and October 2019 Update, we first look to whether the claim recites:

(1) any judicial exceptions, including certain groupings of abstract ideas (i.e., mathematical concepts, certain methods of organizing human activity such as a fundamental economic practice, or mental processes) (“Step 2A, Prong One”); and

(2) additional elements that integrate the judicial exception into a practical application (*see* MPEP §§ 2106.05(a)–(c), (e)–(h) (9th ed. Rev. 08.2017, Jan. 2018)) (“Step 2A, Prong Two”).<sup>4</sup>

Guidance at 51–55.

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<sup>3</sup> In response to public comments, the Office issued further guidance on October 17, 2019, clarifying the Guidance. USPTO, October 2019 Update: Subject Matter Eligibility (“October 2019 Update”) (available at [https://www.uspto.gov/sites/default/files/documents/peg\\_oct\\_2019\\_update.pdf](https://www.uspto.gov/sites/default/files/documents/peg_oct_2019_update.pdf)).

<sup>4</sup> This evaluation is performed by (a) identifying whether there are any additional elements recited in the claim beyond the judicial exception, and (b) evaluating those additional elements individually and in combination to determine whether the claim as a whole integrates the exception into a practical application. *See* Guidance - Section III(A)(2), 84 Fed. Reg. at 54–55.



Only if a claim (1) recites a judicial exception and (2) does not integrate that exception into a practical application, do we then look, under Step 2B, to whether the claim:

(3) adds a specific limitation beyond the judicial exception that is not “well-understood, routine, conventional” in the field (*see* MPEP § 2106.05(d)); or

(4) simply appends well-understood, routine, conventional activities previously known to the industry, specified at a high level of generality, to the judicial exception.

*Id.* at 52–56.

#### *Analysis*

For the reasons explained below, we agree with Appellant that the Examiner has not established that the claimed subject matter is patent-ineligible.

The independent claims on appeal generally relate to methods of detecting binding between proteins and a test compound. Appeal Br. 8–10 (Claims Appendix). A process (or method) is one of the four categories of patent-eligible subject matter enumerated in 35 U.S.C. § 101. We thus proceed to Step 2A, Prong 1 of the Guidance.

#### *Guidance Step 2A, Prong 1*

Pursuant to Step 2A, Prong 1, we analyze whether the claims recite any judicial exception(s) to patent eligibility. Guidance at 54.

The Examiner found that the claims recite “an abstract analysis of data in order to produce new information on a generic sample under investigation,” as well as the “mental step[s]” of “determining whether a protein concentration is increased or decreased (comparison of data which is a mental step) and identifying that a test compound as one which binds to a target based on the increase or decrease.” Ans. 7, 4.

With regard to the three judicially-excepted groupings of abstract ideas identified in the Guidance, we first note that the Examiner did not contend that the claims recite any method of organizing human activity such as fundamental economic practices. *See* Guidance at 52. Indeed, we determine that the claims do not recite any such method.

The Examiner contended that the claims recite mental processes. *See* Ans. 4. Although the Examiner did not make any factual findings substantiating the contention that any step in the claims could practicably be performed in the human mind or with pen and paper, it is arguably conceivable that at least the claimed steps of identifying a protein that binds a test compound could be performed in the mind.<sup>5</sup> Indeed, Appellant did not dispute that the claims recite mental processes as proposed by the Examiner. Accordingly, under the broadest reasonable interpretation standard, we conclude that the claimed steps relating to “identif[ying]” a protein that binds a test compound could be viewed as a mental process, such that the claims recite the judicial exception of mental processes, and, thus, abstract ideas. Accordingly, we will proceed to analyze the claims under Step 2A, Prong 2 of the Guidance.

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<sup>5</sup> The specific language in independent claim 1 reads: “wherein a protein . . . is identified as a protein that binds said test compound” and “wherein a higher concentration of said target protein . . . identifies said test compound as binding the target protein.” The specific language in independent claim 13 reads: “wherein a protein whose concentration [meets the recited parameters] is identified as a protein that binds said test compound.” The specific language in independent claim 18 reads: “wherein any protein whose concentration [meets the recited parameters] is identified as a protein that binds said test compound.” *See* Appeal Br. 8–10 (Claims Appendix).

Before we do so, however, we complete our discussion of the categories of abstract ideas identified in the Guidance by addressing the third category, mathematical concepts. *See* Guidance at 52. We determine that the claims do not recite any mathematical concept, such as a specific mathematical algorithm or formula. *See Flook*, 437 U.S. at 586; *Diehr*, 450 U.S. at 187. To be sure, the claim limitations “wherein said determining is performed in an unbiased manner by Sequential Windowed data independent Acquisition of the Total High resolution Mass spectroscopy (SWATH-MS)” and “wherein said determining is performed in a biased manner by Selected Reaction Monitoring (SRM-MS)” undoubtedly employ mathematical relationships, formulas, or calculations. Nevertheless, those mathematical relationships, formulas, or calculations are not themselves explicitly recited in the claims. *See, e.g., Ex parte Hannun*, Appeal No. 2018-003323, slip op. at 3, 10 (PTAB April 1, 2019) (informative) (where claims recited “obtaining predicted character probabilities output” and specification disclosed an algorithm to obtain the probabilities, finding that the claims did not themselves recite a mathematical concept). Moreover, as further discussed below, even if the claims were considered to recite mathematical concepts, we find that under Step 2A, Prong 2 of the Guidance, the claims integrate any such concepts into a practical application.

*Guidance Step 2A, Prong 2*

“[M]ere recitation of a judicial exception does not mean that the claim is ‘directed to’ that judicial exception under Step 2A Prong Two.” October 2019 Update at 10. Instead, if the claim as a whole integrates the judicial exception into a practical application, the claim is not “directed to” a judicial exception. Guidance at 54; October 2019 Update at 10. As in the

*Mayo/Alice* framework, we must look at the claim elements individually and as an ordered combination to determine whether the additional elements integrate the recited abstract idea(s) into a practical application, such as an improvement to technology or to a technical field. Guidance at 54–55.

As explained in the October 2019 Update, “first the specification should be evaluated to determine if the disclosure provides sufficient details such that one of ordinary skill in the art would recognize the claimed invention as providing an improvement.” October 2019 Update at 12. Second, “the claim must be evaluated to ensure that the claim itself reflects the disclosed improvement.” *Id.* This analysis is performed “without reference to what is well-understood, routine, conventional activity.” *Id.*

Here, the Specification describes the invention as an improvement in the technical field of assays (such as thermal shift assays) that assess the interaction of a compound with a protein. Specifically, the claimed steps recite a method of identifying and quantifying proteins to which a test compound binds in a sample containing numerous proteins, where the interaction between the test compound and proteins are determined using SWATH-MS or SRM-MS. Spec. ¶ 11; Appeal Br. 8–10 (Claims Appendix). According to the Specification, the claimed application of SWATH-MS or SRM-MS to prior art thermal shift assays “overcomes the obstacles” associated with using such assays on “complex protein samples.” Spec. ¶ 6. In particular, the Specification states:

[a]dapt[ing] the SWATH-MS technique to characterizing the results of proteome thermal shift assays *has the highly desirable result of permitting simultaneous analysis of all of the proteins to which a compound is (or is not) bound along with a measure of the affinity of the binding.* This enables identification not only of compounds that are successful in

interacting with a desired target protein, but also assessing the possibility of side effects of a drug, for example, by viewing the interaction of a successful (or unsuccessful) test compound with alternative proteins where interaction is unknown or is not desired.

*Id.* ¶ 7 (emphasis added); *see also* Reply Br. 7–8 (citing Spec. ¶¶ 3–6, 8–11, and Example 1).

Accordingly, in light of the Specification, we find that the claimed subject matter is patent eligible as an improvement in a specific technology, i.e., assays (such as thermal shift assays) that assess the interaction of a compound with a protein. *See* Guidance at 55; *see also Finjan, Inc. v. Blue Coat Sys., Inc.*, 879 F.3d 1299, 1304 (Fed. Cir. 2018) (finding claims patent eligible because the claimed virus scanning method newly permitted protection against unknown computer viruses, whereas prior art methods recognized only known viruses); *Thales Visionix Inc. v. United States*, 850 F.3d 1343, 1349 (Fed. Cir. 2017) (finding claims patent eligible where they “specif[ied] a particular configuration of inertial sensors and a particular method of using the raw data from the sensors in order to more accurately calculate the position and orientation of an object on a moving platform”).

The Examiner appears to suggest that the claimed subject matter is not a patent eligible improvement in a specific technology because “the claims do not indicate an improvement to either the sample or testing methods themselves,” and “only turn to known SWATH-MS or SRM-MS analysis procedures to generate the requisite sample data for analysis.” Ans. 5; *see also id.* at 6. The Examiner also appears to suggest that the sample preparation and separation steps (recited in steps (a)–(c)) are “routine and conventional data gathering activity.” Final Act. 5.

The Examiner's focus on use of existing test methods and known SWATH-MS and SRM-MS methods runs afoul of the Guidance's directive that "Step 2A specifically excludes consideration of whether the additional elements represent well-understood, routine, conventional activity." Guidance at 55. "[A] claim that includes conventional elements may still integrate an exception into a practical application, thereby satisfying the subject matter eligibility requirement of Section 101." *Id.* Additionally, we agree with Appellant that Examiner's analysis improperly "separately analyzes the inventiveness of the 'sample preparation' and 'multiplexing' aspects of claim 1," and "nowhere considers the claim as a whole." Reply Br. 4 (footnotes omitted). We agree with Appellant that, "when considered as a whole, the claims are directed to an improvement in determining test compound interaction with proteins," as discussed above. *Id.*; *see also* Guidance at 54 ("In Prong Two, examiners should evaluate whether the claim as a whole integrates the recited judicial exception into a practical application of the exception.").

In sum, based on the record before us, we are persuaded that the Examiner erred in determining that the claims are directed to a patent-ineligible abstract idea, rather than to a patent-eligible improvement to a technological field.

#### CONCLUSION

We reverse the rejection of claims 1–4 and 13–18 under 35 U.S.C. § 101.

DECISION SUMMARY

<b>Claims Rejected</b>	<b>35 U.S.C. §</b>	<b>Reference(s)/Basis</b>	<b>Affirmed</b>	<b>Reversed</b>
1–4, 13–18	101	Eligibility		1–4, 13–18

REVERSED