

The opinion in support of the decision being entered today
is *not* binding precedent of the Board.

UNITED STATES PATENT AND TRADEMARK OFFICE

**BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES**

Ex parte

MICHAEL SEUL, CHIU WO CHAU, HUI HUANG,
SUKANTA BANERJEE, JIACHENG YANG, and YE HONG

Appeal 2007-2448
Application 10/192,352
Technology Center 1600

Decided: September 11, 2007

Before TONI R. SCHEINER, ERIC GRIMES, and NANCY J. LINCK,
Administrative Patent Judges.

GRIMES, *Administrative Patent Judge.*

DECISION ON APPEAL

This is an appeal under 35 U.S.C. § 134 involving claims to a method for producing chips with biological molecules on their surfaces. The Examiner has rejected the claims as anticipated and obvious. We have jurisdiction under 35 U.S.C. § 6(b). We reverse.

BACKGROUND

“Typically, arrays of biological probes such as DNA, RNA or protein molecules are formed either by deposition and immobilization or by in-situ

synthesis on inert substrates” (Specification 1). The arrays are usually formed “by attaching probe molecules directly to a substrate, which may be composed of organic materials (such as polymeric materials like nitrocellulose) or inorganic materials (such as glass or silicon)” (*id.*).

The Specification discloses a “method for producing biochips . . . compris[ing] patterning a substrate to form a plurality of chip regions, delineating a separating boundary between the chip regions, assembling at least one bead array comprising bio-functionalized, optically encoded beads on a surface of the substrate, and singulating the chip regions to form individual biochips” (*id.* at 7). The term “‘biochip’ . . . refers to a chip having biomolecules attached to its surface. . . . [E]xamples of biomolecules include oligonucleotides, nucleic acid fragments, proteins, oligopeptides,” etc. (*id.*). The term “‘singulate’ or ‘singulation’ . . . refers to a process to obtain chips by breaking the connections between individual chip regions on a substrate or a subunit of a substrate containing more than one chip[]” (*id.*).

DISCUSSION

1. CLAIMS

Claims 2, 9, 24, 26-29, 35-37, 41, and 42 are pending and on appeal.

Claim 2 is representative and reads as follows:

2. A method for producing biochips comprising patterning a substrate, having at least one surface, to form a plurality of biochip regions; by inscribing the substrate between the chip regions; assembling bead arrays comprising many differently optically encoded beads having biomolecules attached thereto said biomolecules being identified by said optical encoding, said assembly occurring on a surface of the substrate within several of the biochip regions but without encoding the location of each biochip region within the substrate; and singulating the

substrate along at least some of the inscriptions to form a plurality of individual biochips with assembled bead arrays thereon.

Thus, claim 2 is directed to a method for producing chips having biomolecule-bearing beads on their surfaces. A substrate is first inscribed to form a pattern of chip regions. Arrays of differently optically encoded biomolecule-bearing beads are assembled on the patterned substrate. The substrate is broken along at least some of the inscriptions to form chips having bead arrays on them.

2. PRIOR ART

The Examiner relies on the following references:

Turner	US 5,948,621	Sep. 7, 1999
Goldberg	US 5,959,098	Sep. 28, 1999
Kobylecki	US 6,153,375	Nov. 28, 2000
Anderson	US 6,713,309 B1	Mar. 20, 2004

Clerc, P-A et al., *Advanced deep reactive ion etching: a versatile tool for microelectromechanical systems*, 8 J. Micromech. Microeng. 272-78 (December 1998).

GLOSSARY OF TERMS USED IN PHYSICAL ORGANIC CHEMISTRY, IUPAC Recommendations 1994, T to Z,
<http://www.chem.qmul.ac.uk/iupac/gtpoc/TtZ.html>.

3. ANTICIPATION

Claims 2 and 26-29 stand rejected under 35 U.S.C. § 102(e) as anticipated by Kobylecki (Answer 3-6).¹

¹ The Examiner also relied on the “GLOSSARY OF TERMS USED IN PHYSICAL ORGANIC CHEMISTRY, IUPAC Recommendations 1994” to

The Examiner cites Kobylecki as disclosing “a method of making a library of compounds using a segmentable support material comprised of a particulate resin [and] a porous laminar material” (*id.* at 3). The Examiner finds that Kobylecki’s method includes the steps of arranging a series of reaction zones on sheets of the support material, producing a unique oligomeric compound on each reaction zone, and then separating the reaction zones from the material by cutting, each zone being provided with a unique label that identifies the compound attached to it (*id.* at 3-4).

Appellants argue that, while Kobylecki discloses labeling the different zones of the support material to indicate the identity of the biomolecules attached to the zones, “[t]here are no ‘differently optically encoded beads having biomolecules attached thereto, said biomolecules . . . identified by said optical encoding . . .’” as required by claim 2 (Br. 5).

For a reference to anticipate a claim “[e]very element of the claimed invention must be literally present, arranged as in the claim.” *Richardson v. Suzuki Motor Co., Ltd.*, 868 F.2d 1226, 1236 (Fed. Cir. 1989).

In the instant case, Kobylecki discloses a process in which a series of unique oligomeric compounds are produced by sequentially attaching monomers to a plurality of superposed paper sheets, followed by cutting the sheets “in a fashion to provide individual pieces of paper, each of which is marked with a single, unique index, which is in itself an identifier of the

establish the inherency of the van der Waals forces recited in claim 29, which depends from claim 2 (Answer 5-6). Because the limitations of claim 2 are dispositive of the anticipation rejection, we do not discuss this reference further.

single, unique chemical structure attached to that portion of paper”
(Kobylecki, col. 6, ll. 54-57).

Kobylecki also discloses

a method of preparing a laminar resin support material for use in the synthesis of chemical compound libraries, which method comprises affixing a layer of particulate functionalised solid support resin material to a porous inert laminar material.

(*Id.* at col. 4, ll. 44-51.)

We will assume, for the sake of argument, that the functionalized resin particles meet claim 2’s requirement for “beads.” However, Kobylecki does not disclose that the particles have any sort of optical encoding identifying the biomolecules that are attached to them. Rather, Kobylecki discloses that “[i]t is an essential feature . . . that individual reaction zones are identified, that is to say, labelled with some form of indicia which uniquely characterises each reaction zone” (*id.* at col. 5, ll. 35-38).

Thus, instead of assembling an array of biomolecule-bearing beads that have different optical encoding that identifies the attached biomolecules, Kobylecki applies the optical indicia to the substrate’s reaction zones. We therefore agree with Appellants that Kobylecki does not describe claim 2’s step of “assembling bead arrays comprising many differently optically encoded beads having biomolecules attached thereto said biomolecules being identified by said optical encoding.”

The Examiner argues that Kobylecki discloses that step in its disclosure that “[e]ach individual reaction zone[] comprises a particulate, functionalized solid support resin and is uniquely label[ed]” (Answer 4, 17-18). The Examiner urges that “[t]he unique labels comprise[] numbers,

letters, symbols or colors in a coded combination (refers to instantly claimed ‘optical encoding’), and they identif[y] the unique chemical compound in each reaction zone (refers to instantly claimed ‘biomolecules being identified by said optical encoding’)” (Answer 4, 18-19).

We are not persuaded by these arguments. We note that the portions of Kobylecki identified by the Examiner disclose applying optical indicia to the various reaction zones, so as to identify the molecule attached to each unique zone. However, claim 2 requires the arrayed *beads* to have different optical encoding that identifies the molecules attached to the beads. None of the portions of Kobylecki cited by the Examiner discloses a bead having optical encoding that identifies the biomolecule attached to it. Nor do we see any other disclosures in Kobylecki that would remedy this deficiency.

Therefore, because Kobylecki does not disclose all of the limitations in claim 2, we reverse the Examiner’s anticipation rejection of that claim. We also reverse the anticipation rejection of claims 26-29, which depend from claim 2 and include all of its limitations.

4. OBVIOUSNESS

Claims 2, 9, 24, 26-29, and 36 stand rejected under 35 U.S.C. § 103 as obvious over Kobylecki and Goldberg (Answer 6-11).² Claims 2, 26-29, and 35 stand rejected under 35 U.S.C. § 103 as obvious over Kobylecki and

² The Examiner also relied on Clerc to establish that deep reactive ion etching, recited in claim 24, “is a well known method of scribing in the semiconductor industry” (Answer 9-10). Claim 24 depends from claim 2. Because the limitations of claim 2 are dispositive of the obviousness rejection, we do not discuss this reference further.

Turner (*id.* at 11-14). Claims 37, 41, and 42 stand rejected under 35 U.S.C. § 103 as obvious over Kobylecki, Goldberg, and Anderson (*id.* at 14-16).

Claim 2 is the only independent claim, and therefore all of the claims rejected as obvious require claim 2's step of "assembling bead arrays comprising many differently optically encoded beads having biomolecules attached thereto said biomolecules being identified by said optical encoding." In each of the obviousness rejections, the Examiner relies solely on Kobylecki's disclosure to meet that limitation (*see* Answer 7, 12, 15). As discussed above, however, we do not agree with the Examiner that Kobylecki discloses that limitation. Moreover, the Examiner does not point to, and we do not see, where Kobylecki or any of the other references suggests performing claim 2's "assembling" step.

"[O]bviousness requires a suggestion of all limitations in a claim," *CFMT, Inc. v. Yieldup Intern. Corp.*, 349 F.3d 1333, 1342 (Fed. Cir. 2003) (citing *In re Royka*, 490 F.2d 981, 985 (CCPA 1974)). Because we do not agree with the Examiner that the cited references suggest a process having claim 2's step of "assembling bead arrays comprising many differently optically encoded beads having biomolecules attached thereto said biomolecules being identified by said optical encoding," and because all of the claims rejected as obvious require that step, we reverse the Examiner's obviousness rejections of claims 2, 9, 24, 26-29, 35-37, 41, and 42.

SUMMARY

We reverse the Examiner's rejection of claims 2 and 26-29 under 35 U.S.C. § 102(e) as anticipated by Kobylecki. We also reverse the

Appeal 2007-2448
Application 10/192,352

Examiner's rejections of claims 2, 9, 24, 26-29, 35-37, 41, and 42 under 35 U.S.C. § 103.

REVERSED

Ssc

MORGAN & FINNEGAN, L.L.P.
3 WORLD FINANCIAL CENTER
NEW YORK, NY 10281-2101