

The Paper Trail of Knowledge, Revisited

Kevin Bryan, Yasin Ozcan, Bhaven Sampat

Rotman – January 17, 2024



Sometimes we can trace
famous inventions and
discoveries – Sharpey-
Schafer, Minkowski,
Langerhans...

A REAGENT FOR THE DETECTION OF REDUCING SUGARS.

By STANLEY R. BENEDICT.

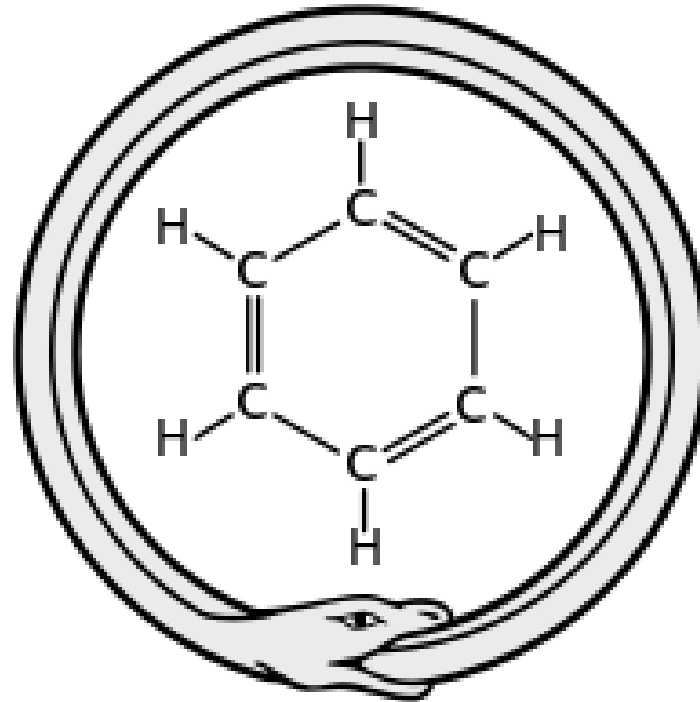
(From the Sheffield Laboratory of Physiological Chemistry, Yale University.)

(Received for publication, December 18, 1908.)

It has already been shown that the hydroxides of the alkali metals have a greater destructive action upon dextrose and various other carbohydrates than have the carbonates,¹ and in accordance with this fact, a copper-containing solution in which the alkalinity is secured by sodium carbonate makes a more delicate and specific test for the detection of dextrose than does a copper solution which contains sodium hydroxide. A reagent of this nature, containing copper sulphate, Rochelle salt, and sodium carbonate, was suggested in a previous paper.² This reagent affords a delicate test solution for dextrose, but it has the disadvantage common to so many of the alkaline copper solutions, viz: that after mixing, it rapidly deteriorates and soon becomes useless for detecting small quantities of sugar. For this reason it seemed desirable to obtain a solution in which the alkalinity is secured by carbonate, and which shall at the same time

What to do?

Inventor biographies



Firm Surveys

Though these generally have limited and only surface-level coverage

Most common: patent prior art



US006763791B2

(12) **United States Patent**
Gardner et al.

(10) **Patent No.:** **US 6,763,791 B2**
(45) **Date of Patent:** **Jul. 20, 2004**

(54) **CAM PHASER FOR ENGINES HAVING TWO CHECK VALVES IN ROTOR BETWEEN CHAMBERS AND SPOOL VALVE**

(75) **Inventors:** **Marty Gardner, Ithaca, NY (US); Michael Duffield, Medina, NY (US)**

(73) **Assignee:** **BorgWarner Inc., Auburn Hills, MI (US)**

(*) **Notice:** Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) **Appl. No.:** **10/198,476**

(22) **Filed:** **Jul. 18, 2002**

(65) **Prior Publication Data**

US 2003/0033999 A1 Feb. 20, 2003

Related U.S. Application Data

(60) **Provisional application No. 60/312,140, filed on Aug. 14, 2001.**

(51) **Int. Cl. 7** **F01L 1/34**

(52) **U.S. Cl.** **123/90.17; 125/90.15**

(58) **Field of Search** **123/90.13, 90.15**

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Primary Examiner—Thomas Denion

Assistant Examiner—Zelalem Eshete

(74) *Attorney, Agent, or Firm*—Brown & Michaels PC; Greg Dziegielewski

(57) **ABSTRACT**

An infinitely variable camshaft timing device (phaser) has a control valve located in the rotor. Since the control valve is in the rotor, the camshaft need only provide a single passage for supplying engine oil or hydraulic fluid, and does not need multiple passageways for controlling the phaser, as in the prior art. Two check valves, an advance chamber check valve and a retard chamber check valve, are also located in the rotor. The check valves are located in the control passages for each chamber. The main advantage of putting the check valves in the advance and retard chambers instead of having a single check valve in the supply is to reduce leakage. This design also eliminates high pressure oil flow across the spool valve and improves the response time of the check valve to the torque reversals due to a shorter oil path. In addition, the phaser of the present invention outperforms an oil pressure actuated device and consumes less oil.



Two major issues:
Does front page prior-art
actually reflect knowledge
transfer?

And what kind?

METHOD AND SYSTEM FOR REVERSING INDUCED DISCRIMINATION

RELATED APPLICATION

[0001] This application claims the benefit of U.S. Provisional Application No. 60/305,068, filed Jul. 13, 2001, which filing date is claimed herein, and the content of which is herein incorporated by reference.

FIELD OF THE INVENTION

[0002] This invention relates generally to the field of employment practices, specifically a method and system by which induced discrimination is reversed and race/gender-blind hiring is enhanced.

BACKGROUND OF THE INVENTION

[0003] Employment discrimination is generally defined by a set of five laws administered by the Equal Employment Opportunity Commission (EEOC). These include the Equal Pay Act of 1963, prohibiting sex based wage discrimination; Title VII of the Civil Rights Act of 1964, prohibiting employment discrimination based on race; color, religion, sex and national origin, the Age Discrimination in Employment Act of 1967 (ADEA), prohibiting employment discrimination against persons 40 years of age or older, the Americans with Disabilities Act of 1990 (ADA), prohibiting employment discrimination against qualified individuals with disabilities, and the Civil Rights Act of 1991, modifying the prior laws to allow compensatory and punitive damages in cases of employer "malice or reckless indifference to the rights of aggrieved individuals."

[0004] Past empirical work has tended to show that the Civil Rights laws and EEOC enforcement have improved economic conditions for protected groups (see, e.g., Heckman et al., *Amer. Econ. Rev.* 79:138-177 (1989); Leonard, *Amer. Econ. Rev.*, 86(2):285-289 (1996)). However, recent authors have expressed concerns that, to the contrary, the laws have actually induced discrimination (Posner, *Univ. Pennsylvania Law Rev.*, 136:13-519 (1987); Donohue et al., *Stanford Law Review* 43:983-1033 (1991); Abram, *American Economic Rev.* 83(2):62-66 (1993); Acemoglu et al., *NBER Working Paper* 6670 (1998); Oyer et al., Working Paper 00-26, *Journal of Labor Economics*, 20(1):1-24 (2000)).

number of charges over time, and FIG. 2, which traces the employer hazard rate (total number of charges per year as a percentage of total employment). Thus, the combination of increased cost per charge (higher damage awards), together with the increased likelihood of such charges, has substantially increased the cost of terminating an employee who falls within a legally protected group. In fact a new line of insurance, Employment Practices Liability Insurance, emerged in 1990 in anticipation of increased employer exposure from CRA-91.

[0006] Since the implicit wage for a employee is money wages plus employment litigation costs, litigious employees are more costly than non-litigious employees. Thus, all things being equal, an employer would rationally prefer hiring a non-litigious employee, thereby avoiding litigation costs, just as employers prefer to hire non-disabled employees to avoid accommodation costs.

[0007] There is no illegal discrimination in avoiding litigious employees. The problem of induced discrimination arises because there is no reliable signal of litigiousness, and thus employers use protected group membership as a proxy index for the probability of litigation by an employee. The underlying logic for use of the index is that protected group employees have more grounds on which to sue employers. The net result is that litigious employees impose an externality on protected group employees in the form of induced discrimination. This externality is dissipative—low risk employees incur losses from reduced employment opportunity (on average one week employment per protected group employee since CRA-91 [number derived from CPS data for the years following CRA-91]), while the offsetting gains to high-risk employees are trivial (the expected value of a plaintiff award in employment cases is less than \$1000, wherein the number is derived from all federal employment suits terminated in 1996. The data comes from the Integrated Data Base (IDB)).

[0008] Thus, it appears that induced discrimination can be avoided if money wages for protected groups are allowed to adjust to correct for the higher termination costs. However, wage discrimination is unlawful under EEOC regulation. An alternative adjustment mechanism would be to increase the hiring costs of young white males. This is accommodated through anti-discriminatory hiring provisions in the EEOC



Our results:

- 1) Extract all in-text references
- 2) Show large in-text/front page diff
- 3) Large-scale inventor survey
- 4) Use ML on *text surrounding these cites* to “extend” survey to full corpus
- 5) Revisit classic innovation Qs now that we have “access” to meaning

Extraction problem: 1TB of raw XML, in different formats

Cites like “Genomic DNA was obtained from leaf tissue according to Doyle and Doyle (1987).” in US6483012.

Algorithm:

- 1) Drop paragraphs w/o year
- 2) Index rest of pat. corpus
- 3) From list of articles, search “near” years for combo of 1st author, journal abbreviation, first words of title, page numb...

Very few Type I errors

Able to capture ones like

“methods for aligning sequences using the CLUSTAL program are well described by Higgins and Sharp in *Gene*, 73: 237-244 (1988) and in *CABIOS* 5: 151-153 (1989).”

Now available:

A public database of *universe* of in-text patent-paper citations going back to 1800: 16.8 million of them!

(Marx and Fuegi 2020)

Key figure:

68% of in-text cites not on FP

79% of FP cites not in-text.

What exactly do these
citations mean?

Legal definition + empirics

A legal model to have in mind

- inventors have comparative advantage in knowing origin of invention
 - lawyers have comp adv in law
 - knowledge transfer is costly
- patent has technical requirements and must have background and method such that “skilled in the art” inventors can follow

Implication:

In-text cites more likely to be known by inventor, more likely to be knowledge inputs to invention

Front-page cites more likely to measure “similar” things to invention, hence to proxy for value

Check 1: Biotechnology pairs



171 patent-paper pairs

Of article citations:

avg of 6.9 in patent text

avg of 4.1 on front page

171 patent-paper pairs

Median patent:

13% of article cites in-text

6.3% of articles cites on FP

171 patent-paper pairs

25% have 0 article cites on FP

10% have 0 article cites in-text

171 patent-paper pairs

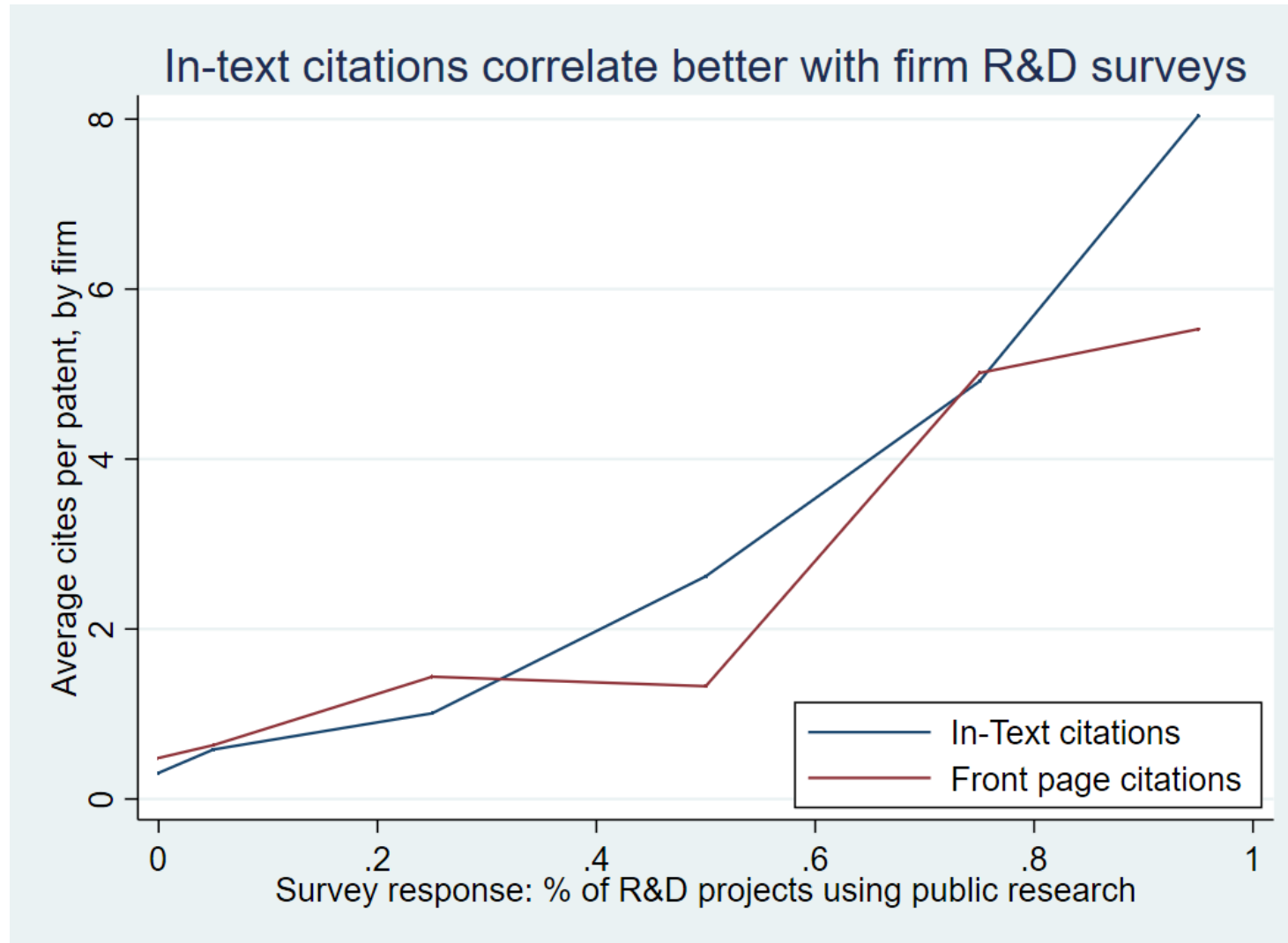
Not driven by rote copying of
article text:

only 12.9% have even half of
article cites in-text

Check 2: R&D Manager Surveys

Carnegie Mellon survey explicitly asked about firm's reliance on public sector spillovers

R&D Manager Surveys



So in-text citations help us trace “the paper trail” of invention, and figure out which prior inventions were important...but they are actually even better!

- We survey over 1000 inventors and ask
- how familiar are you with it
 - when did you first learn this knowledge
 - what is the link to your invention (tool, opportunity, background knowledge, technical feasibility)
 - who added this reference
 - was it critical to success of invention
 - is it similar to your invention

METHOD AND SYSTEM FOR REVERSING INDUCED DISCRIMINATION

RELATED APPLICATION

[0001] This application claims the benefit of U.S. Provisional Application No. 60/305,068, filed Jul. 13, 2001, which filing date is claimed herein, and the content of which is herein incorporated by reference.

FIELD OF THE INVENTION

[0002] This invention relates generally to the field of employment practices, specifically a method and system by which induced discrimination is reversed and race/gender-blind hiring is enhanced.

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number of charges over time, and FIG. 2, which traces the employer hazard rate (total number of charges per year as a percentage of total employment). Thus, the combination of increased cost per charge (higher damage awards), together with the increased likelihood of such charges, has substantially increased the cost of terminating an employee who falls within a legally protected group. In fact a new line of insurance, Employment Practices Liability Insurance, emerged in 1990 in anticipation of increased employer exposure from CRA-91.

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[0008] Thus, it appears that induced discrimination can be avoided if money wages for protected groups are allowed to adjust to correct for the higher termination costs. However, wage discrimination is unlawful under EEOC regulation. An alternative adjustment mechanism would be to increase the hiring costs of young white males. This is accommodated through anti-discriminatory hiring provisions in the EEOC

Most
interesting,
though:
Not just a
better
measure, but
a *deeper*
measure

METHOD AND SYSTEM FOR REVERSING INDUCED DISCRIMINATION

RELATED APPLICATION

[0001] This application claims the benefit of U.S. Provisional Application No. 60/305,068, filed on Oct. 10, 2001, the entire contents of which filing date is claimed herein, and the entire contents of which are hereby incorporated by reference.

FIELD OF THE INVENTION

[0002] This invention relates generally to employment practices, specifically a method for reversing induced discrimination, and more particularly to blind hiring is enhanced.

BACKGROUND OF THE INVENTION

[0003] Employment discrimination is governed by a set of five laws administered by the Equal Opportunity Commission (EEOC). These laws include the Pay Act of 1963, prohibiting sex based wage discrimination; Title VII of the Civil Rights Act of 1964, prohibiting employment discrimination based on race, sex and national origin; the Age Discrimination Act of 1967 (ADEA), prohibiting employment discrimination against persons 40 years of age and older; the Americans with Disabilities Act of 1990 (ADA), prohibiting employment discrimination against qualified individuals with disabilities; and the Civil Rights Act of 1991, amending the prior laws to allow compensatory and punitive damages in cases of employer "malice or reckless indifference to the rights of aggrieved individuals."

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avoiding liti- discrimination giousness, and nip as a proxy employee. The otected group ie employers. pose an exter- rm of induced ve—low risk ment opportu- otected group

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METHOD AND SYSTEM FOR REVERSING INDUCED DISCRIMINATION

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[0001] This application claims the benefit of U.S. Provisional Application No. 60/305,068, filed on 10/10/98, the entire contents of which filing date is claimed herein, and the entire contents of which are hereby incorporated by reference.

FIELD OF THE INVENTION

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employee who has a new line of business. The insurance, however, is not a new employer.

employee is money wage employees. Thus, all employees prefer litigation. The disabled employ-

avoiding litigation. Discrimination is a proxy for the employee. The protected group are employers. These are an external effect of induced discrimination—low risk employment opportunity for the protected group.

employee since CRA-91 [number derived from CPS data for the years following CRA-91]), while the offsetting gains to high-risk employees are trivial (the expected value of a plaintiff award in employment cases is less than \$1000, wherein the number is derived from all federal employment suits terminated in 1996. The data comes from the Integrated Data Base (IDB)).

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This is a "concept that could be improved" or a "motivation for the invention" in my read

membranes. Membranes were probed with hybridoma 1 supernatant (A) and hybridoma 2 supernatant (B). Western blotting showed that the mouse anti-peptide antibodies bound peptide conjugated to albumin (lanes 2 and 4) but didn't react with albumin (lanes 1 and 3). The molecular weight of approximately 70 kDa corresponded with the predicted molecular weight of 16 amino acids (2 kDa) and albumin (68 kDa).

Recombinant SRD5AIII in vitro assays, Ad-SRD5AIII infected CV-1 cells and uninfected CV-1 control cells were prepared using methods of Titus et al. (Titus et al. Clin Cancer Res 2005;11:4365:4371) and Pratis et al. (Pratis et al. J Steroid Biochem Mol Biol 2000;75:75-82). All steps prior to incubation were carried out at 4C. SRD5AIII specific activity

ovirus. pDC316-SRD5AIII shuttle plasmid containing the murine CMV promoter was cotransfected with pBHG loxp (Microbix), that contains the adenovirus type 5 genome with E1 and E3 region deletions, into HEK 293 cells using SuperFect® transfection system (Qiagen, Valencia, Calif.) according to the manufacturer's protocol. HEK 293 cells and medium were harvested when cytopathic effects appeared. Cells were subjected to three cycles freeze/thaw lysis in a dry ice-ethanol bath and centrifuged at 5000 rpm for 5 min at 4° C. to remove cellular debris. The supernatant was saved as virus stock. Adenovirus (Ad-SRD5AIII) was

using RNeasy Mini Kit (Qiagen). RNA samples (3 µg) were reverse-transcribed using reverse transcriptase (Invitrogen). cDNA was amplified by PCR using SRD5AIII gene specific primers; forward, 5'-CGG AAC AAG GGT TCC TGC TGA CCC TAC TGC T-3' (SEQ ID NO:9); reverse, 5'-TGA GTC AAG GGA GCT TTC CTA TGC TTC GGG TA-3' (SEQ ID NO:10). PCR amplification was performed at 95° C. for 2 min; and 30 cycles of 95° C for 30 sec, 51° C. for 30 sec, and 72° C. for 1 min; and 72° C. for 10 min. The PCR product was resolved on 1% agarose gel containing 0.2 µg/ml ethidium bromide in TAE buffer, and the band of interest was visualized under UV light.

[0064] Solubilization and deglycosylation of CV-1-expressed SRD5AIII. In an attempt to increase the solubility or mobility of expressed SRD5AIII protein on SDS-PAGE, cell extracts of Ad-SRD5AIII infected CV-1 cells were treated with inclusion body solubilization reagent (Pierce) or deglycosylation enzymes (Sigma), respectively, according to the manufacturer's instructions.

[0065] Recombinant SRD5AIII in vitro assays. Ad-SRD5AIII infected CV-1 cells and uninfected CV-1 control cells were prepared and assayed for SRD5AIII using methods of Titus et al. (Titus et al. Clin Cancer Res 2005;11:4365-4371) and Pratis et al. (Pratis et al. J Steroid Biochem Mol Biol 2000;75:75-82). All steps prior to incubation were carried out at 4° C. SRD5AIII specific activity was expressed in pmol/mg protein/hr using Ad-SRD5AIII infected CV-1 cells.

[0066] Ad-SRD5AIII infected CV-1 cells or uninfected CV-1 cells were homogenized in 0.5 ml ice-cold homogenization buffer (50 mM potassium phosphate [pH 7.4], 0.25M sucrose, 1 mM EDTA, 1 mM dithiothreitol, 1 mM fresh phenylmethylsulfonyl chloride, 1× Complete™ protease inhibitor [Roche, Indianapolis, Ind.] using a PowerGen 125 (Fischer Scientific) for two 10-second bursts and sonicated (Branson Sonifier CD200, SmilthKline) at 20% power for 15 one-second bursts. Final homogenates were centrifuged at 500 ×g for 1 min to remove particulate. The resulting cell free supernatants were placed on ice and used immediately. Protein concentrations were measured using the procedure of Lowry et al. (Lowry et al. J Biol Chem 1951; 193:265-75).



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This refers to a tool used in the invention



tive layers comprising fullerene derivatives mixed with for example conducting polymers as described in for example

Additional descriptions for applications is provided: For electrochromics applications and devices, including mirrors, see for example Argun et al, Av. Mater. 2003, 15, 1338-1341 (all polymeric electrochromic devices). For example, the sulfonated polymer exhibits very good stability in the oxidized form (i.e., very clear in the visible region). Mirros with good stability in the clear state

[0269] Combinations of brightness, efficiency, and lifetime can be achieved. For example, brightness can be at least 1,000 cd/m², efficiency can be at least 1.00 Cd/A, and lifetime can be at least 1,000 hours, at least 2,500 hours, or at least 5,000 hours.

OPV Measurements

[0270] Methods known in the art can be used to measure OPV parameters.

[0271] J_{SC} values (mA/cm²) can be for example at least 6, or at least 7, or at least 8, or at least 9, or at least 10, or at least 11, or at least 12. The values can be for example about 5 to about 12, or about 5 to about 15, or about 5 to about 20.

Baytron materials can be obtained from H. C. Stark. Carbazole compounds are described in for example WO 2004/072205 to Brunner et al.

[0277] Degradation rate can be also examined (see for example FIG. 16). Degradation time until normalized power output is zero for a cell substantially similar to that of FIG. 16 and for the conditions described therefore can be for example at least 250 hours, or at least 300 hours, or at least 400 hours, or at least 500 hours.

[0278] Other types of devices which interact with light and or electricity/electric fields can be fabricated including sensors and transistors including field effect transistors (e.g., as electrodes or as active channel material, e.g., for use in logic circuits and other electronic circuitry). In particular, pH sensors, or sensors which are sensitive to detection of compounds which have functionalities which can bind to acid can be made and used in for example an optical sensing tool. Other device applications include for example supercapacitors (e.g., light weight power sources functioning as storage media with good charge capacity), cation transducers (e.g., devices featuring a cation binding event causing an optical or electrical signal), drug release (e.g., drugs with ionic functionalities can be bound to the polymer and a redox chemistry can trigger the release of the drug into the body; or an embedded microchip with the polymer can help trigger the release of the drug into the body by changing the doping profile), electrochromics, actuators (e.g., electrochemical doping/de-doping also can change the volume of the polymer which is the basis for actuating mechanism. Applications based on this can involve artificial muscles activated by electrical pulse, or also smart membranes with tunable pore size for purification of solvents), transparent electrodes to replace for example ITO, and membranes.

[0279] Additional description for applications is provided:
 [0280] For electrochromics applications and devices, including mirrors, see for example Argun et al., Adv. Mater. 2003, 15, 1338-1341 (all polymeric electrochromic devices). For example, the sulfonated polymer exhibits very good stability in the oxidized form (i.e., very clear in the visible region). Mirrors with good stability in the clear state can be

This is a description of a similar invention or of a use of the present invention



alternative conditions use serum-supplemented CMRL 1066 (CMRL) and culture at 25° C. prior to transplantation. On D3 (65% islets) the culture was 24.6% CD133+. The fraction of cells expressing CD133 increased between 1.5- and 1.8-fold under all conditions (FIG. 2).

Example 5

CD133+ Population Increases in the Context of ADM and is Enhanced by Inhibition of Notch Activation

[0062] The expression of CD133, CK19, the acinar cell marker amylase (AMY) and Notch regulated genes was investigated in two independent islet preparations (70% and


[0065] An increase in CD133+ cells over time and in response to DAPT has been observed in more than 15 independent cultures. However, in two instances, cultures failed to increase in the percentage of CD133+ cells or respond to DAPT.

Example 6

Notch Signaling Represses PTF1 and NGN3 mRNA Levels

[0066] Pancreas specific transcription factor, 1a (PTF1) plays critical roles in formation and spatial organization of the murine exocrine and endocrine pancreas (Krapp A et al., The bHLH protein PTF1-p48 is essential for the formation of the

This is a piece of background knowledge



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exocrine and the correct spatial organization of the endocrine pancreas. Genes Dev 12:3752-3763, 1998) and marks precursor cells that give rise to all exocrine and most endocrine cells (Kawaguchi Y et al., The role of the transcriptional regulator Ptf1a in converting intestinal to pancreatic progenitors. Nat Genet 32:128-134, 2002). In mouse (Fukuda A et al., Ectopic pancreas formation in Hes1-knockout mice reveals plasticity of endodermal progenitors of the gut, bile duct, and pancreas. J Clin Invest 116:1484-1493, 2006) and zebrafish (Esni F et al., Notch inhibits Ptf1 function and acinar cell differentiation in developing mouse and zebrafish pancreas. Development 131:4213-4224, 2004) PTF1 is negatively regulated by HES1. The impact of culture and inhibition of Notch signaling on the mRNA expression levels of human PTF1 was investigated in the two independent islet preparations cultured in both MM1A and CMRL media. The mRNA expres-

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What can we learn?
Not just “I combined two fields” but “I combined tool X from outside with basic knowledge Y from my field”

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