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English

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(71) **Applicants** (for all designated States except US): **ILLUMINA, INC.** [US/US]; 5200 Illumina Way, San Diego, California 92122 (US). **ILLUMINA CAMBRIDGE LTD.** [GB/GB]; Chesterford Research Park, Nr Saffron Walden, Essex CB10 1XL (GB).

(72) Inventors; and

(75) **Inventors/Applicants** (for US only): **KLAUSING, Kay** [DE/US]; 5200 Illumina Way, San Diego, California 92122 (US). **SHEN, Min-Jui Richard** [US/US]; 5200 Illumina Way, San Diego, California 92122 (US). **MOORE, John** [US/US]; 5200 Illumina Way, San Diego, California 92122 (US). **SMITH, Vincent** [GB/GB]; Little Chesterford, Nr Saffron Walden, Essex CB10 1XL (GB). **HALL, Kevin** [GB/GB]; Little Chesterford, Nr Saffron Walden, Essex CB10 1XL (GB). **GORMLEY, Niall Anthony**

[GB/GB]; Little Chesterford, Nr. Saffron Walden, Essex CB10 1XL (GB). **IOANNOU, Avgousta** [GB/GB]; Little Chesterford, Nr. Saffron Walden, Essex CB10 1XL (GB). **FRITZILAS, Epameinondas** [GR/GB]; Little Chesterford, Nr. Saffron Walden, Dyfed CB10 1XL (GB). **RIGATTI, Roberto** [IT/GB]; Chesterford Research Park, Little Chesterford, Essex CB10 1XL (GB).

(74) **Agents:** **THOMAS, Tiffany B.** et al.; 5200 Illumina Way, San Diego, California 92122 (US).

(81) **Designated States** (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

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[Continued on next page]

(54) Title: METHODS FOR REDUCING NUCLEIC ACID DAMAGE

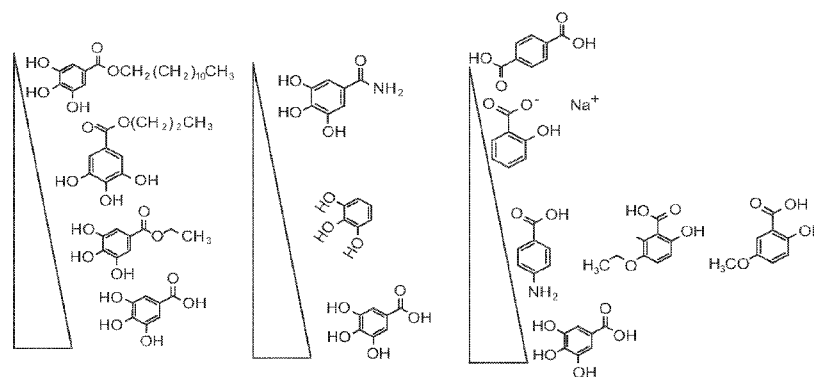


Fig. 1

(57) **Abstract:** Provided herein is a method of inhibiting degradation of nucleic acids during a nucleic acid processing step selected from fragmentation and detection comprising contacting the nucleic acids with a solution comprising gallic acid, analogues, derivatives thereof or mixtures thereof, during the processing step, wherein the contacting inhibits degradation of the nucleic acids. Also provided herein is a method of inhibiting light-induced degradation of nucleic acids. Additionally, provided herein is a method of reducing or inhibiting nucleic acid damage during preparation of a nucleic acid sample comprising fragmenting the nucleic acid sequences in the sample in a solution comprising one of more compounds, the compounds inhibiting degradation of the nucleic acid sequences in the sample.

**Declarations under Rule 4.17:**

- as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))
- as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii))
- before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments (Rule 48.2(h))

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Published:

- with international search report (Art. 21(3))

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2012/021040**A. CLASSIFICATION OF SUBJECT MATTER***C12Q 1/68(2006.01)i, C12Q 1/48(2006.01)i, G01N 33/53(2006.01)i*

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

C12Q 1/68; G01N 33/53

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Korean utility models and applications for utility models

Japanese utility models and applications for utility models

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

eKOMPASS(KIPO internal) & Keywords:gallic acid, ascorbic acid, urea, Fpg, nucleic acid degradation, DNA damage

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	YEN, G-C. et al., 'Antioxidant and pro-oxidant properties of ascorbic acid and gallic acid', Food Chemistry, November 2002, vol.79, Issue.3, pp.307-313.	25-27
A	See abstract.	1-3, 7-24
Y	SUN, N-K. et al., 'Damaged DNA-binding protein 2 (DDB2) protects against UV irradiation in human cells and Drosophila', Journal of Biomedical Science, 17 April 2010, vol.17, no.27. pp.1-14.	25-27
A	See abstract.	1-3, 7-24
Y	COSTE, F. et al., 'Bacterial base excision repair enzyme Fpg recognizes bulky N7-substituted-FapydG lesion via unproductive binding mode', Chemistry & Biology, 21 July 2008, vol.15, Issue.7, pp.706-717.	25-27
A	See abstract.	1-3, 7-24
Y	GANDHI, N.M. et al., 'Protection of DNA and membrane from gamma radiation induced damage by gallic acid', Molecular and Cellular Biochemistry, October 2005, vol.278, pp.111-117.	25-27
	See abstract.	



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

23 AUGUST 2012 (23.08.2012)

Date of mailing of the international search report

24 AUGUST 2012 (24.08.2012)

Name and mailing address of the ISA/KR

Korean Intellectual Property Office
189 Cheongsu-ro, Seo-gu, Daejeon Metropolitan
City, 302-701, Republic of Korea

Facsimile No. 82-42-472-7140

Authorized officer

Lee Hyojin

Telephone No. 82-42-481-8743



INTERNATIONAL SEARCH REPORT

International application No.

PCT/US2012/021040

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A		1-3,7-24
A	US 2010-0143945 A1, (KHOSHMAN, A.; PATTERSON, P.H.) 10 June 2010. See abstract.	1-3,7-27

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US2012/021040**Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)**

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☒ Claims Nos.: 5,6
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

Claims 5,6 are unclear, as they refer to the multiple dependent claims which are not drafted in accordance with the third sentence of Rule 6.4(a).
3. ☒ Claims Nos.: 4
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
- ☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- ☐ No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/US2012/021040

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2010-0143945 A1	10.06.2010	WO 2010-065927 A2	10.06.2010
		WO 2010-065927 A3	10.06.2010