SUCHST DU NOCH ODER LIEST DU SCHON?

Wie bringt man einem Computer Zukunftsforschung bei?

KATI@INT

Dr. Marcus John

Tag der Offenen Tür

8. Juli 2017

Fraunhofer INT

Euskirchen

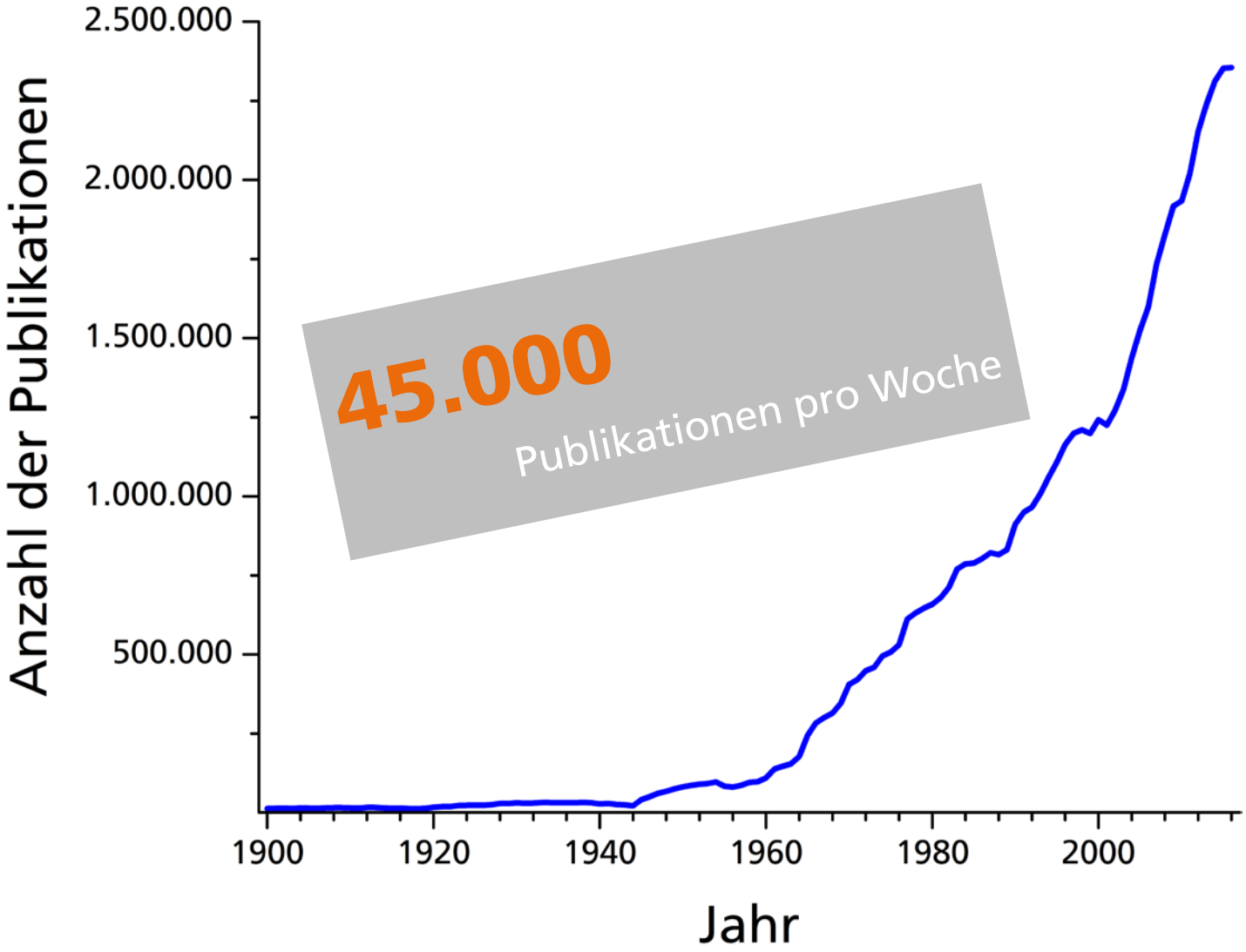
Fraunhofer INT


Wie bezahlen wir
in Zukunft im Laden?
Woraus werden Pumpen
im Jahre 2030 gebaut?
Können wir den
Menschen
leistungsfähiger machen?
Werden wir 2035 noch
Waschmaschinen haben?

Wir benötigten eine Art

Science Observatory

Mehr als 2.300.000 Publikationen 2016



European Journal of Mineralogy

Comparing single-particle analysis data of volcanic ash of the 2010 Eyjafjallajökull eruption obtained from scanning electron and light microscope images

Frank Sommer, Christoph Maschowski, Volker Dietze, Bernard Grobéty, Reto Gieré

DOI: 10.1127/ejm/2016/0028-2555 Published on December 2016, First Published on June 08, 2016

Abstract

This study examines the influence of different analysis techniques on the results concerning the particle size distribution and mineralogical composition of airborne particles. Volcanic ash from the Eyjafjalla volcano was examined with a transmitted light microscope (TLM), a scanning electron microscope (SEM), SEM equipped with an automatic single-particle analysis program, and an electron microprobe (EMP) and the results differ considerably. Main error source is the specific partic
method. Here, a sample containing airborne particles of volcanic material was anal
on the evaluation area per unit time (number settling rate). The result
obtained by manual SEM and EMP analysis

The NEW ENGLAND JOURNAL of MEDICINE

BRIEF REPORT

Zika Virus Associated with Microcephaly

Jernej Mlakar, M.D., Misa Korva, Ph.D., Nataša Tul, M.D., Ph.D., Mara Popović, M.D., Ph.D., Mateja Poljšak-Prijatelj, Ph.D., Jerica Mraz, M.Sc., Marko Kolenc, M.Sc., Katarina Resman Rus, M.Sc., Tina Vesnaver Vipotnik, M.D., Vesna Fabjan Vodušek, M.D., Alenka Vizjak, Ph.D., Jože Pižem, M.D., Ph.D., Miroslav Petrovec, M.D., Ph.D., and Tatjana Avšič Županc, Ph.D.

SUMMARY

A widespread epidemic of Zika virus (ZIKV) infection was reported in 2015 in South and Central America and the Caribbean. A major concern associated with this infection is the apparent increased incidence of microcephaly in fetuses born to mothers infected with ZIKV. In this report, we describe the case of an expectant mother who had a febrile illness with rash at the end of the first trimester of pregnancy while she was living in Brazil. Ultrasonography performed at 29 weeks of gestation revealed microcephaly with calcifications in the fetal brain and placenta. After the mother requested termination of the pregnancy, [illegible] was performed. Micrencephaly (an abnormally small br[illegible] almost complete agyria, hydrocephalus, and multi[illegible] the cortex and subcortical white matter, wi[illegible] mild focal inflammation. ZIKV [illegible]

Construction and Building Materials 129 (2016) 1–10

Contents lists available at ScienceDirect

Construction and Building Materials

journal homepage: www.elsevier.com/locate/conbuildmat

Air pollutant emissions and acoustic performance of hot mix asphalts

Lin Shiying *, Hung Wingtat, Leng Zhen

The Department of Civil and Environmental Engineering, The Hong Kong Polytechnic University, Hong Kong

HIGHLIGHTS

- Temperature has a great effect on gaseous and particulate emissions.
- Total PAHs observed is still far below the specified limitation.
- The PM2.5 variations on the construction site can be significant.
- VOC concentrations are in general extremely low from the laboratory and the filed.
- The PMSMA6 shows the best low noise performance among the other tested surface types.

ARTICLE INFO

ABSTRACT

This pap

Journal of Alloys and Compounds 663 (2016) 94–99

Contents lists available at ScienceDirect

Journal of Alloys and Compounds

journal homepage: http://www.elsevier.com/locate/jalcom

Magnetic/structural phase diagram and zero temperature coefficient of resistivity in $GaCFe_{3-x}Co_x$ ($0 \leq x \leq 3.0$)

X.C. Kan [a, b], B.S. Wang [a, *], S. Lin [a], B. Yuan [a], L. Zu [a, b], X.F. Wang [a, b], J.C. Lin [a], P. Tong [a], W.H. Song [a, *], Y.P. Sun [c, a, d]

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ARTICLE INFO

Article history:
Received 28 April 2015
Received in revised form
16 December 2015
Accepted 20 December 2015
Available online 23 December 2015

Keywords:
/structural phase diagram

ABSTRACT

Magnetic/structural phase diagram of $GaCFe_{3-x}Co_x$ ($0 \leq x \leq 3.0$) were investigated systematically. It was found that the antiperovskite phase collapses at $x = 0.90$ and recovers again at $x = 2.3$ with Co doping. Along with this transformation, the ferromagnetic state in $GaCFe_3$ is sup
reentrant spin-glass state ($2.3 \leq x \leq 2.6$) or enhanced ma
ceptibility and magnetic relaxation were adopted
that the contractive lattice as well as th
origin of the collapsed antipe
achieved by Co-dopin
perature T

Exploiting Weak PUFs From Data Converter Nonlinearity—E.g., A Multibit CT $\Delta\Sigma$ Modulator

Andreas Herkle, *Student Member, IEEE*, Joachim Becker, *Member, IEEE*, and Maurits Ortmanns, *Senior Member, IEEE*

***Abstract*—This paper presents a novel approach of deriving physical unclonable functions (PUF) from correction circuits measuring and digitizing nonlinearities of data converters. The often digitally available correction data can then be used to generate a fingerprint of the chip. The general concept is presented and then specifically evaluated on an existing Delta-Sigma ($\Delta\Sigma$) modulator whose outermost feedback DAC mismatches are greatly influencing the overall performance and thus need correction. The applied mixed-signal correction scheme reveals the intrinsic mismatches which are firstly used to linearize the $\Delta\Sigma$ modulator, but also be further analyzed. The intra-Ham**

equally weighted unit elements as they introduce differential nonlinearities (DNL) which reduce the effective resolution of the conversion result [4]. While the influence of a single mismatching unit element might be small enough to be neglected, the summed up output of many elements in a data converter results in an integral nonlinearity (INL)
significantly decr
sion

A&A 594, A13 (2016)
DOI: 10.1051/0004-6361/201525830

Planck 2015 results

Astronomy & Astrophysics
Special feature

Planck 2015 results

XIII. Cosmological parameters

Planck Collaboration: P. A. R. Ade[105], N. Aghanim[71], M. Arnaud[87], M. Ashdown[83,7], J. Aumont[71], C. Baccigalupi[103], A. J. Banday[117,12], R. B. Barreiro[78], J. G. Bartlett[1,80], N. Bartolo[38,79], E. Battaner[120,121], R. Battye[81], K. Benabed[72,116], A. Benoît[69], A. Benoit-Lévy[29,72,116], J.-P. Bernard[117,12], M. Bersanelli[41,58], P. Bielewicz[97,12,103], J. J. Bock[80,14], A. Bonaldi[81], L. Bonavera[78], J. R. Bond[11], J. Borrill[17,109], F. R. Bouchet[72,107], F. Boulanger[71], M. Bucher[1], C. Burigana[57,39,59], R. C. Butler[57], E. Calabrese[112], J.-F. Cardoso[88,1,72], A. Catalano[89,86], A. Challinor[75,83,15], A. Chamballu[87,19,71], R.-R. Chary[68], H. C. Chiang[33,8], J. Chluba[28,83], P. R. Christensen[98,44], S. Church[111], D. L. Clements[67], S. Colombi[72,116], L. P. L. Colombo[27,80], C. Combet[89], A. Coulais[86], B. P. Crill[80,14], A. Curto[78,7,83], F. Cuttaia[57], L. Danese[103], R. D. Davies[81], R. J. Davis[81], P. de Bernardis[40], A. de Rosa[57], G. de Zotti[54,103], J. Delabrouille[1], F.-X. Désert[64], E. Di Valentino[72,107], C. Dickinson[81], J. M. Diego[78], K. Dolag[119,94], H. Dole[71,70], S. Donzelli[58], O. Doré[80,14], M. Douspis[71], A. Ducout[72,67], J. Dunkley[112], X. Dupac[47], G. Efstathiou[75,83,⋆], F. Elsner[29,72,116], T. A. Enßlin[94], H. K. Eriksen[76], M. Farhang[11,102], J. Fergusson[15], F. Finelli[57,59], O. Forni[117,12], M. Frailis[56], A. A. Fraisse[33], E. Franceschi[57], A. Frejsel[98], S. Galeotta[56], S. Galli[82], K. Ganga[1], C. Gauthier[1,93], M. Gerbino[114,100,40], T. Ghosh[71], M. Giard[117,12], Y. Giraud-Héraud[1], E. Giusarma[40], E. Gjerløw[76], J. González-Nuevo[23,78], K. M. Górski[80,123], S. Gratton[83,75], A. Gregorio[42,56,63], A. Gruppuso[57], J. E. Gudmundsson[114,100,33], J. Hamann[115,113], F. K. Hansen[76], D. Hanson[95,80,11], D. L. Harrison[75,83], G. Helou[14], S. Henrot-Versillé[85], C. Hernández-Monteagudo[16,94], D. Herranz[78], S. R. Hildebrandt[80,14], E. Hivon[72,116], M. Hobson[7], W. A. Holmes[80]
A. Hornstrup[20], W. Hovest[94], Z. Huang[11], K. M. Huffenberger[31], G. Hurier[71], A. H. Jaffe[67], T. R. Jaffe[117,12]
E. Keihänen[32], R. Keskitalo[17], T. S. Kisner[91], R. Kneissl[46,9], J. Knoche[94], L. Knox[35], M. Ku
A. Lähteenmäki[2,52], J.-M. Lamarre[86], A. Lasenby[7,83], M. Lattanzi[39,60], C. R. Law
F. Levrier[86], A. Lewis[30], M. Liguori[38,79], P. B. Lilje[76], M. Linden-V
G. Maggio[56], D. Maino[41,58], N. Mandolesi[57,39], A. M

CHEMICAL REVIEWS

Review

pubs.acs.org/CR

Noncovalent Functionalization of Graphene and Graphene Oxide for Energy Materials, Biosensing, Catalytic, and Biomedical Applications

Vasilios Georgakilas,[†] Jitendra N. Tiwari,[‡] K. Christian Kemp,[‡,∥] Jason A. Perman,[§] Athanasios B. Bourlinos,[§] Kwang S. Kim,[*,‡] and Radek Zboril[*,§]

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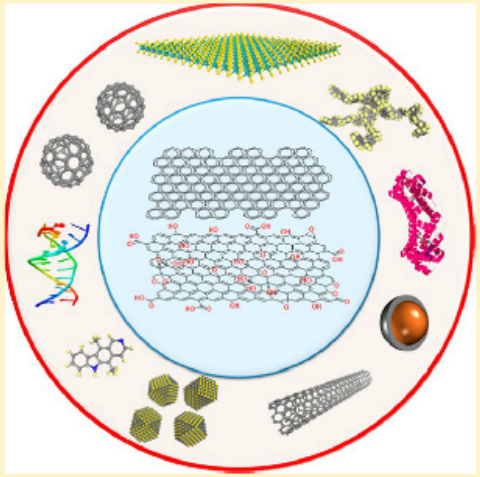
[‡]Center for Superfunctional Materials, Department of Chemistry, Ulsan National Institute of Science and Technology (UNIST), Ulsan 689-798, Korea

[§]Regional Centre of Advanced Technologies and Materials, Department of Physical Chemistry, Faculty of Science, Palacky University in Olomouc, 17 Listopadu 1192/12, 771 46 Olomouc, Czech Republic

ABSTRACT: This Review focuses on noncovalent functionalization of graphene and graphene oxide with various species involving biomolecules, polymers, drugs, metals and metal oxide-based nanoparticles, quantum dots, magnetic nanostructures, other carbon allotropes (fullerenes, nanodiamonds, and carbon nanotubes), and graphene analogues (MoS_2, WS_2). A brief description of $\pi-\pi$ interactions, van der Waals forces, ionic interactions, and hydrogen bonding allowing noncovalent modification of graphene and graphene oxide is first given. The main part of this Review is devoted to tailored functionalization for applications in drug delivery, energy materials, solar cells, water splitting, biosensing, bioimaging, environmental, catalytic, photocatalytic, and biomedical technologies. A significant part of this Review explores the possibilities of graphene/graphene oxide-based 3D superstructures and their use in lithium-ion batteries. This Review ends with a look at challenges and future prospects of noncovalently modified graphene and graphene oxide.



PRL 116, 061102 (2016) Selected for a Viewpoint in *Physics*
PHYSICAL REVIEW LETTERS
week ending
12 FEBRUARY 2016

Observation of Gravitational Waves from a Binary Black Hole Merger

B. P. Abbott *et al.*[*]
(LIGO Scientific Collaboration and Virgo Collaboration)
(Received 21 January 2016; published 11 February 2016)

On September 14, 2015 at 09:50:45 UTC the two detectors of the Laser Interferometer Gravitational-Wave Observatory simultaneously observed a transient gravitational-wave signal. The signal sweeps upwards in frequency from 35 to 250 Hz with a peak gravitational-wave strain of 1.0×10^{-21}. It matches the waveform predicted by general relativity for the inspiral and merger of a pair of black holes and the ringdown of the resulting single black hole. The signal was observed with a matched-filter signal-to-noise ratio of 24 and a false alarm rate estimated to be less than 1 event per 203 000 years, equivalent to a significance greater than 5.1σ. The source lies at a luminosity distance of 410^{+160}_{-180} Mpc corresponding to a redshift $z = 0.09^{+0.03}_{-0.04}$. In the source frame, the initial black hole masses are $36^{+5}_{-4} M_{\odot}$ and $29^{+4}_{-4} M_{\odot}$, and the final black hole mass is $62^{+4}_{-4} M_{\odot}$, with $3.0^{+0.5}_{-0.5} M_{\odot} c^2$ radiated in gravitational waves. All uncertainties define 90% credible intervals. These observations demonstrate the existence of binary stellar-mass black hole systems. This is the first direct detection of gravitational waves and the first observation of a binary black hole merger.

DOI: 10.1103/PhysRevLett.116.061102

I. INTRODUCTION

A 2.2 μW, -12 dBm RF-Powered Wireless Current Sensing Readout Interface IC With Injection-Locking Clock Generation

Fu-To Lin, *Student Member, IEEE*, Shao-Yung Lu, *Student Member, IEEE*, and Yu-Te Liao, *Member, IEEE*

***Abstract*—This paper presents a wireless-powering current-sensing readout system on a CMOS platform for portable electrochemical measurement. The wireless sensing system includes energy-efficient power management circuitry, a sensor readout interface, and a backscattering wireless communication scheme. For power-and-area-constrained bio-sensing applications, the proposed readout circuitry incorporates an ultra-low-power potentiostatic system that generates a current according to the electrochemical reaction, as well as an oscillator-based time-to-digital converter instead of a voltage-domain analog-to-digital converter. To avoid a bulky battery and power-hungry clock reference, the chip is wirelessly powered and injection-locked by the modulated radio waves, which includes a 918 MHz carrier signal mixed with a 3.2 MHz modulated signal. The chip, implemented using a 0.18-μm CMOS process, occupies a silicon area of 1 mm^2. The proposed design achieves a sensitivity of 289 Hz/nA and**

a point of care, these devices need to be capable of portable biomedical analysis at a low cost. With the advent of CMOS technology, an electrochemical sensor array can be integrated on a single silicon chip [4] for bio-implants and wearables. The dense sensing array, small form factor, and reduced long external connections of these microsystems extend the limit of detection resolution by improving the signal-to-noise ratio and reducing environmental interference coupling. The development of a CMOS-based electrochemical platform would enable a new breed of highly

Physics Letters B 759 (2016) 191–199

Contents lists available at ScienceDirect

Physics Letters B

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750 GeV diphoton resonance, 125 GeV Higgs and muon $g-2$ anomaly in deflected anomaly mediation SUSY breaking scenarios

Fei Wang [a,b,*], Lei Wu [c], Jin Min Yang [b,d], Mengchao Zhang [b]

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[b] Key Laboratory of Theoretical Physics, Institute of Theoretical Physics, Academia Sinica, Beijing 100190, China
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ARTICLE INFO

Article history:
Received 22 March 2016
Received in revised form 4 May 2016
Accepted 21 May 2016
Available online 25 May 2016
Editor: G.F. Giudice

ABSTRACT

We propose to interpret the 750 GeV diphoton excess in deflected anomaly mediation supersymmetry breaking scenarios, which can naturally predict couplings between a singlet field and vector-like messengers. The CP-even scalar component (S) of the singlet field can serve as the 750 GeV resonance. The messenger scale, which is of order the gravitino scale, can be as li... the messenger species N_F and the deflection parameter d... induce the large loop decay process $S \to \gamma\gamma$... accommodate the 125 GeV Higgs bos... conflicting with the LHC co... mediation supersy...

LETTER

doi:10.1038/nature16484

A lithium–oxygen battery based on lithium superoxide

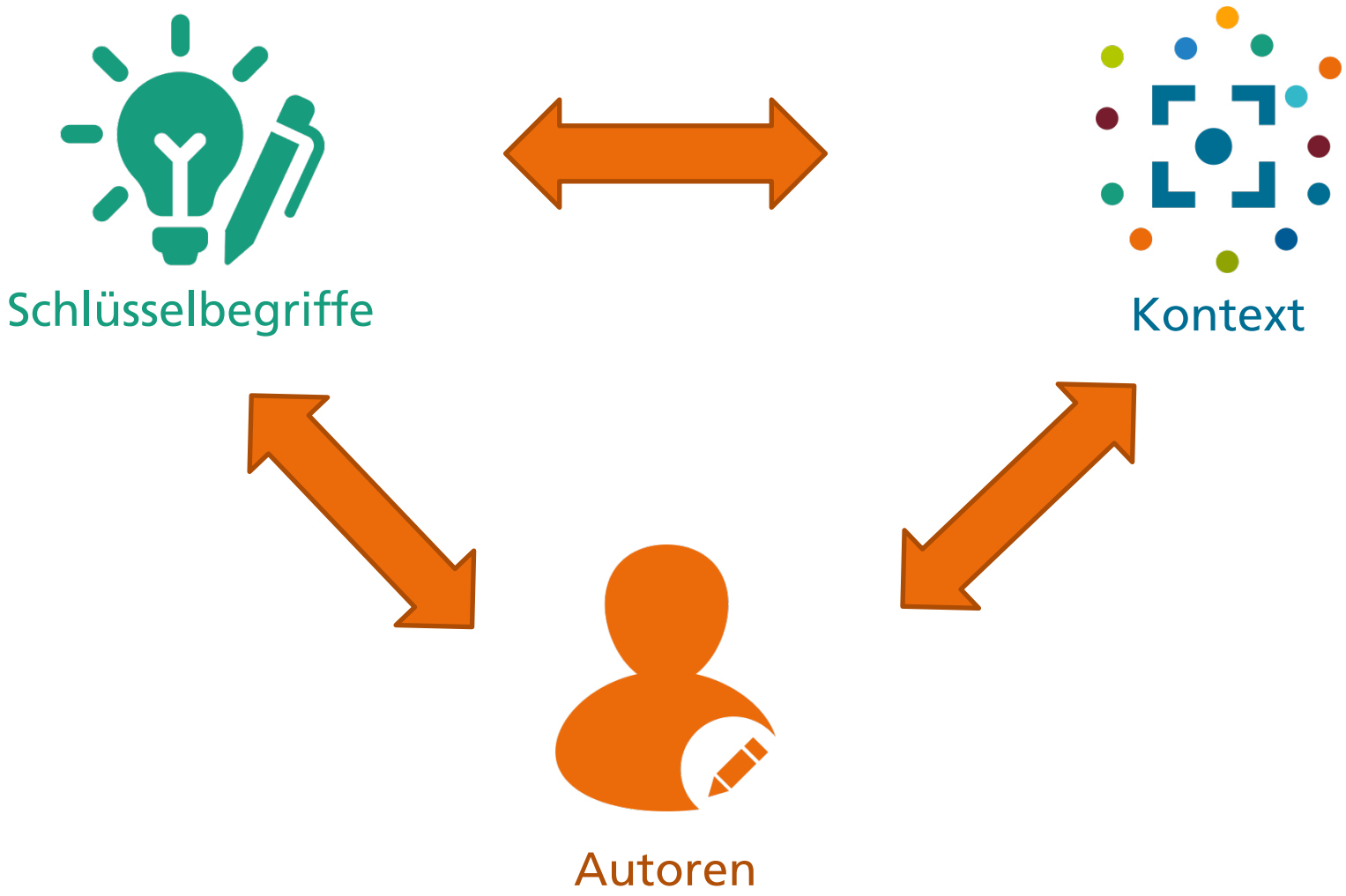
Jun Lu[1]*, Yun Jung Lee[2]*, Xiangyi Luo[3,4]*, Kah Chun Lau[3]*, Mohammad Asadi[5]*, Hsien-Hau Wang[3], Scott Brombosz[3], Jianguo Wen[6], Dengyun Zhai[1], Zonghai Chen[1], Dean J. Miller[6], Yo Sub Jeong[2], Jin-Bum Park[2], Zhigang Zak Fang[4], Bijandra Kumar[7], Amin Salehi-Khojin[5], Yang-Kook Sun[2], Larry A. Curtiss[3] & Khalil Amine[1]

Batteries based on sodium superoxide and on potassium superoxide have recently been reported[1–3]. However, there have been no reports of a battery based on lithium superoxide (LiO_2), despite much research[4–8] into the lithium–oxygen ($Li–O_2$) battery because of its potential high energy density. Several studies[9–16] of $Li–O_2$ batteries have found evidence of LiO_2 being formed as one component of the discharge product along with lithium peroxide (Li_2O_2). In addition, theoretical calculations have indicated that some forms of LiO_2 may have a long lifetime[17]. These studies also suggest that it might be possible to form LiO_2 alone for use in a battery. However, solid LiO_2 has been difficult to synthesize in pure form[18] because it is thermodynamically unstable with respect to disproportionation, giving Li_2O_2 (refs 19, 20). Here we show that crystalline LiO_2 can be stabilized in a $Li–O_2$ battery by using a suitable graphene-based cathode. Various characterization techniques reveal no evidence [illegible] of Li_2O_2. A novel templating growth [illegible]

electrolyte (1 M $LiCF_3SO_3$ in tetraethylene glycol dimethyl ether (TEGDME)) impregnated into a glass fibre separator, and a porous cathode. A current density of 100 mA g^{-1} was used for both discharge and charge, and the cell was run with a capacity limit of 1,000 mA h g^{-1} to avoid side reactions. The specific capacity (mA h g^{-1}) and the current density (mA g^{-1}) are based on the active materials of the O_2 electrodes. Figure 2a and b shows voltage profiles for the Ir–rGO and rGO cathode architectures, respectively. The Ir–rGO discharge product shows a very low charge potential of ~3.2 V that rises to 3.5 V over 40 cycles leading to more than 85% efficiency in this system (Fig. 2a). The voltage profile of the rGO cathode sho[illegible] potential of ~4.2 V with a lo[illegible]

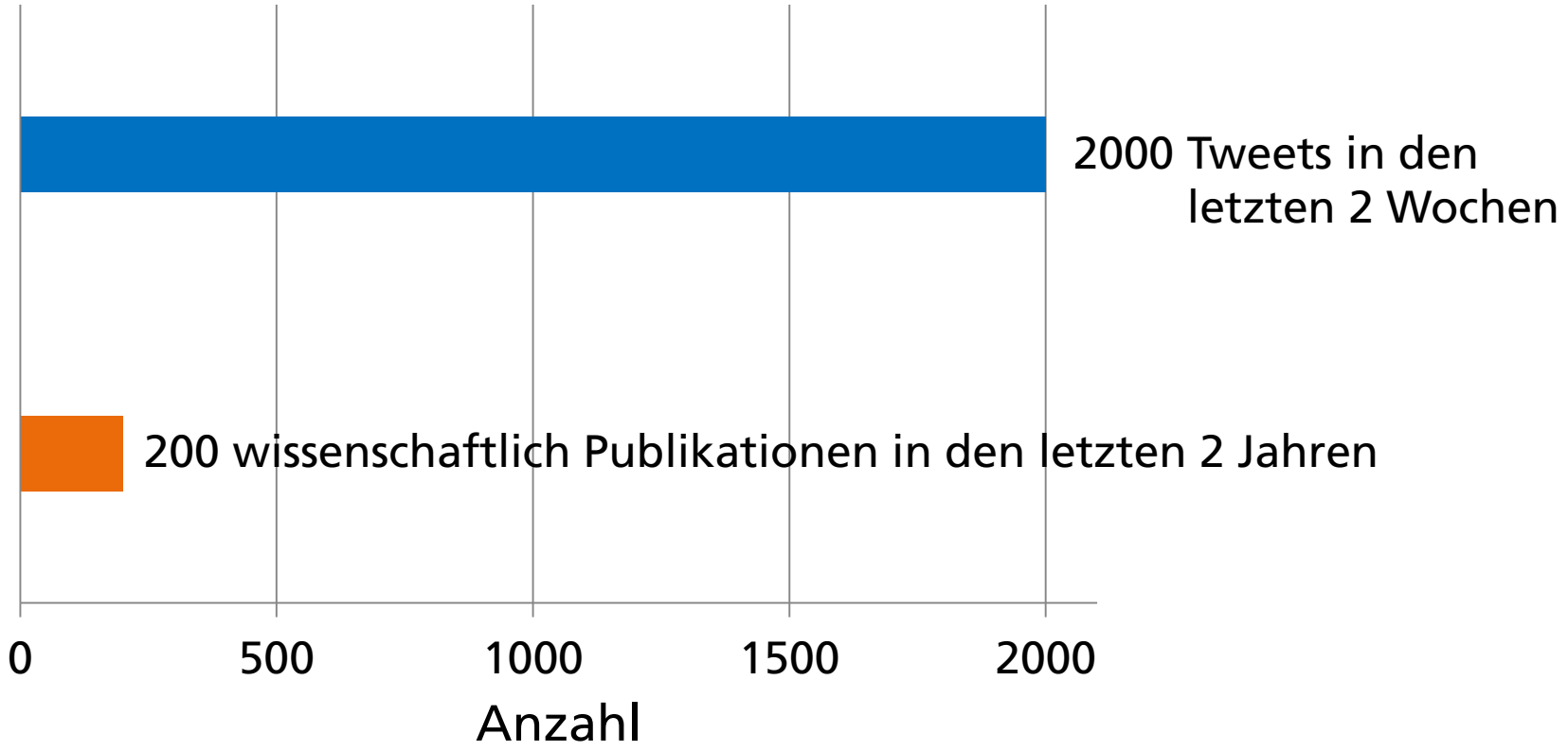
The discharg[illegible] exami[illegible]

Woran erkennt man das?




Kann man das dem Computer bei bringen?
Cognitive Computing
in der Zukunfsforschung

Cognitive Computing – it's a Buzzword



IBM Watson siegt mit der

Technologie des *Cognitive*

Computing bei Jeopardy!

Cognitive Computing ist …

…. ein Sammelsurium von Technologien

- Computer Linguistik
- Content Analytics

Inhalte, Kontext und Bedeutung analysieren

- Suchfunktionalität für große Text- und Datenmengen

Leistungsfähige, konfigurierbare Suche

- Effiziente Verfahren des Maschinellen Lernens

- Muster erkennen
- Hypothesen generieren
- Vorhersagen machen

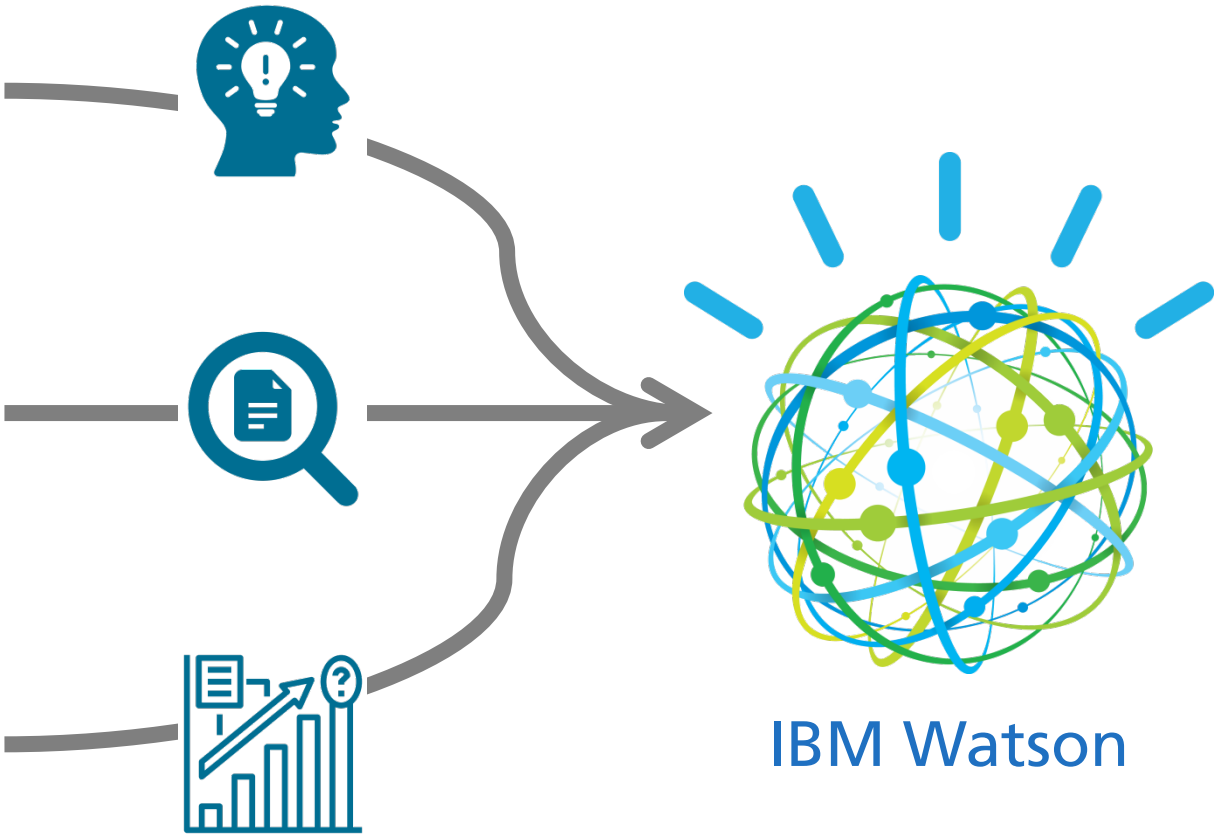
Cognitive Computing ist …

… ein Softwarepaket von IBM!

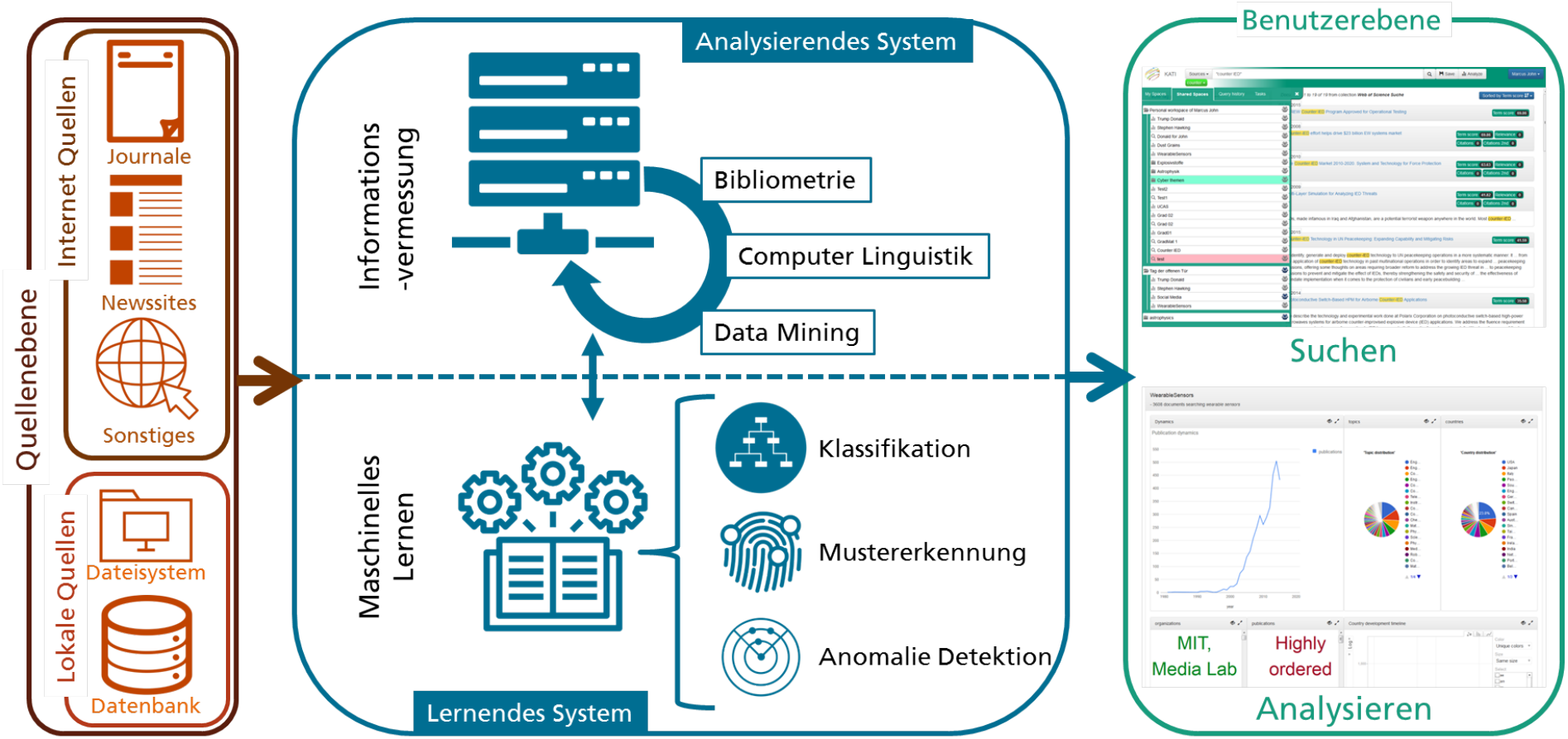
- Computer Linguistik
- Content Analytics

- Suchfunktionalität für große Text- und Datenmengen

- Effiziente Verfahren des Maschinellen Lernens



Unser Ansatz



Aus ….

IBM Watson

… wird KATI

Knowledge **A**nalytics for**T**echnology & **I**nnovation

with Watson

Fraunhofer INT

Wo stehen wir heute?

Planung & Aufbau der Hardware

Software installiert

Datenmodell entworfen und Datenbank befüllt

50.542.097 Datensätze des Web of Science in die Watson Maschine importiert

Visualisierungen programmieren

Schnittstellen implementiert

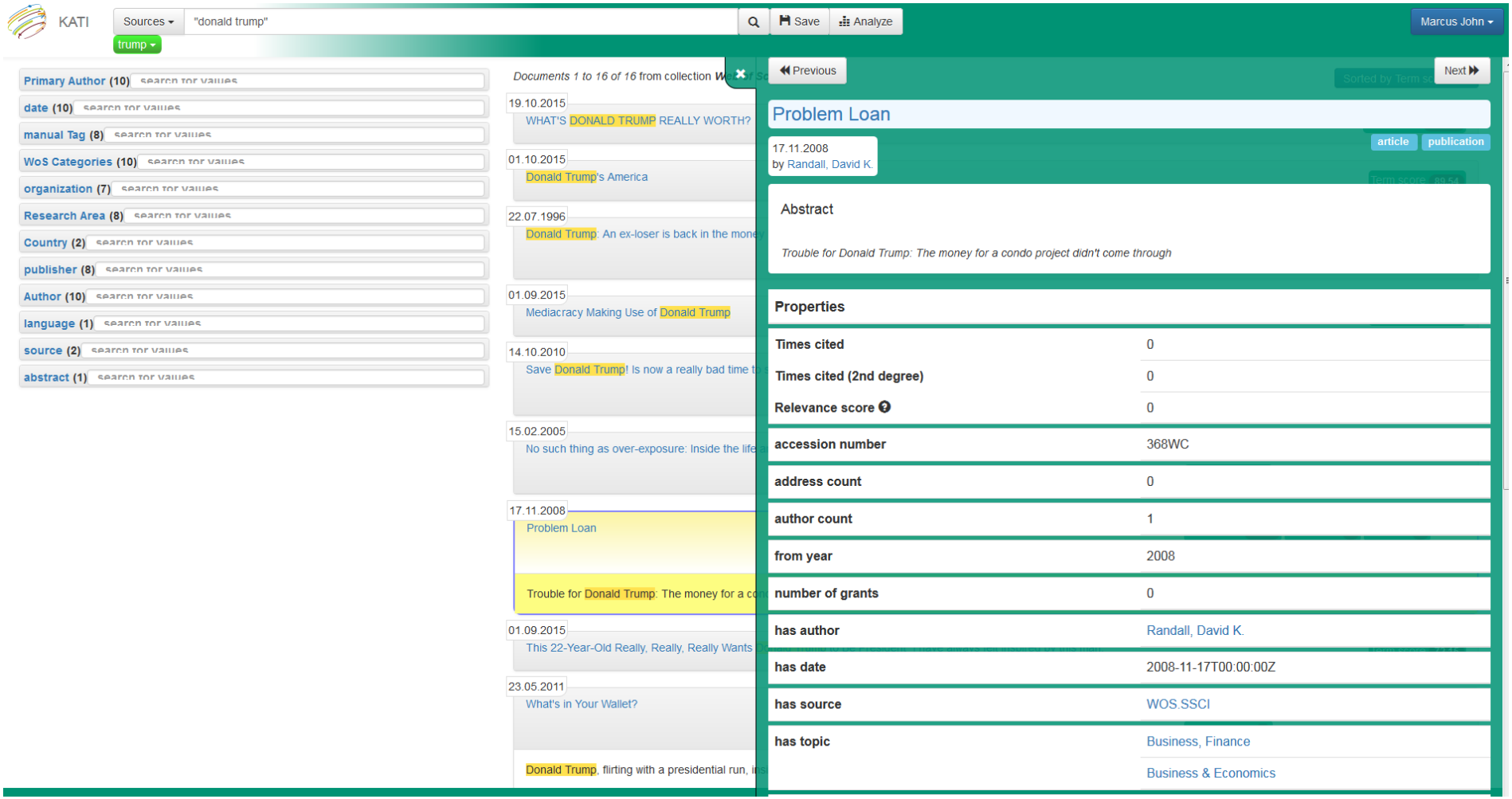
Anwendungsfälle realisiert

Inhalt des Web of Science erschlossen

Weitere Quellen erschließen

Es gib noch viel zu tun

Suchoberfläche



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Analyseoberfläche

Eine Demonstration gibt es im Raum Bonn!

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An KATI beteiligte Personen

Kontakt

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