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EDITORIAL

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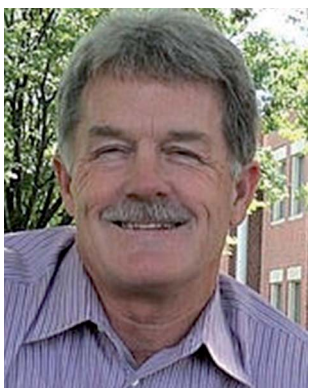
JAAS – 30 years of manuscripts, citations, and scientific impact

This editorial, honoring the 30th year of *JAAS* publication, reprises one that the author wrote in 2006 in recognition of the 20th anniversary of the journal.[1] In the 2006 editorial, we took a retrospective look at the journal through the lens of its top 20 publications, and we take the same approach here, looking at the journal's top 30 publications over the last 30 years (using manuscript citations as the measure – controversial as it may be). As before we also use citation data provided by the Web of Science (Thomson Reuters). The analysis is interesting in terms of both analytical trends and citation behavior.

Table 1 *JAAS* publication citation facts, 1986–2015 (with comparable data from 1986–2006)

Total *JAAS* issues	324 (206)
Total *JAAS* manuscripts	6189 (3724)
Total *JAAS* manuscript times cited	134 595 (17 791)
Average citations per *JAAS* manuscript	21.75 (4.78)
h-index for *JAAS* journal	103
Citation distribution	**# publications**
>200 citations	15 (1)
101–200 citations	92 (30)
51–100 citations	491 (187)
26–50 citations	1212 (410)
6–25 citations	2848 (2071)
1–5 citations	946 (854)
0 citations	585 (171)

We again start with a look at some higher-level figures of interest for the journal (Table 1). There have now been 324 issues of the journal, with over 6000 research manuscripts that have resulted in nearly 135 000 citations. The h-factor for the journal stands at 103, meaning there are 103 manuscripts with at least 103 citations each. The average number of citations/paper has jumped from 4.8 in 2006 to 21.8 in 2016, indicating that the journal is being read and cited more frequently. The citation number



David W. Koppenaal is Chief Technology Officer at the Environmental Molecular Sciences Center (EMSL) at Pacific Northwest National Laboratory in Richland, WA. His research interests include the development of new instrumental techniques for analytical and metallomics applications. He was an early adopter of ICPMS in 1984, and has been a leading developer of new approaches and refinements of ICPMS since that time. His innovations include the development and demonstration of effective reaction cell technology and associated ion molecule reaction approaches for interference reduction in ICPMS. More recently he has developed array detector technologies and ultra-high resolution orbital trapping atomic spectroscopy techniques. Dr Koppenaal has also served as an Editorial Board member of both JAAS *and* Metallomics*, where he continues to serve in Advisory Committee capacities. He additionally served as Chair of the Analytical Division of the American Chemical Society. Dr Koppenaal is a Fellow of the Royal Society of Chemistry, the American Association for the Advancement of Science, and the American Chemical Society.*

distribution provided in Table 1 also shows a notable increase in the number of papers with higher numbers of citations. All of these facts corroborate that the journal is being read often and is held in high esteem within the analytical science community.

The journal's top 30 publications are provided in rank order of citations in Table 2. As one might expect, a number of the 2006 Top 20 publications again appear in this list. In fact, 16 of the 2006 Top 20 publications reappear, including all of the first 13 publications from that listing. Those papers are shown in Table 1 with their 2006 ranking (parenthetically) alongside the current new ranking. Most of these older papers, again as one might expect, have fallen relatively in the new ranking. But several have risen, and in rather dramatic fashion. These include two landmark laser ablation papers (Longerich, Jackson, Günther; Rank 1 paper; and Günther *et al.*, Rank 3 paper), and an isotope dilution ICPMS paper by Klaus Heumann *et al.* (Rank 6 paper). Other general trends are apparent, including a decrease in impact of graphite furnace AA papers, speciation papers, and ICPMS interference papers. Of the newer papers in the current Top 30 list, all except one are from the 1993–2004 publication years, indicating that it takes significant time and citation history (10–20 years!) to generate a significant number of citations to make the top 30 list. The lone paper published since the top 20 ranking made in 2006 is the 2008 Hu *et al.* paper (# 30 in this ranking) on the enhancement effect of adding nitrogen gas in the ICP for LA-ICPMS. That paper has resulted in 154 citations in only 7 years since publication. This mirrors what was observed in the 2006 ranking – that ranking only included highly cited papers up to 1998, and again shows that most highly cited papers take years to accumulate those citations. The distribution by year for the new Top 30 papers is given in Fig. 1, and interestingly indicates that in most years at least one top paper results each year over the 1986–2004 time period for the journal.

Significant in this list of Top 30 papers is the contribution from the Detlef Günther group at ETH, Switzerland. That group has 5 papers in the Top 30, and 4 in the top 10 of this list! This is clearly a major contribution from a former Editorial Board member and Chair of this journal. The Bernard Welz group also had 3 papers in this list and Andrew Walder/Phil Freedman and E. H. Larsen also have 2 papers each in this list.

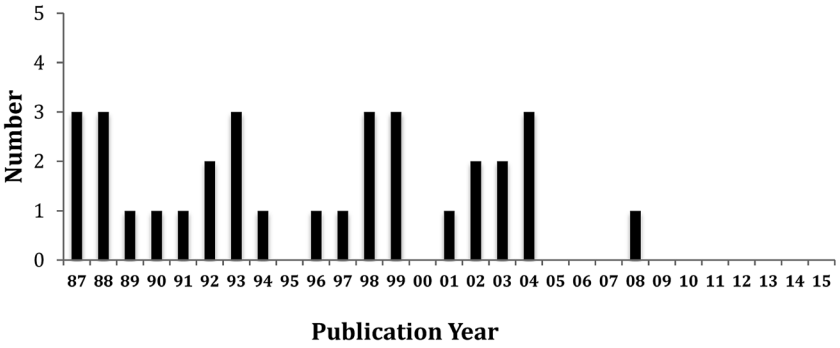


Fig. 1 Distribution by year for the Top 30 *JAAS* papers shown in Table 2. Note only a single paper past 2004 has received sufficient citations yet to qualify as a Top 30 Paper!

Review of these top papers by technique (Fig. 2) indicates that ICPMS remains the technique of choice, with 9 ICPMS papers and 8 LA-ICPMS papers respectively. Graphite furnace AA papers and miscellaneous other techniques follow behind in comparison. Compared to the 2006 distribution, laser ablation has clearly gained prominence over furnace techniques in the last decade. In terms of paper type (Fig. 3, subjective

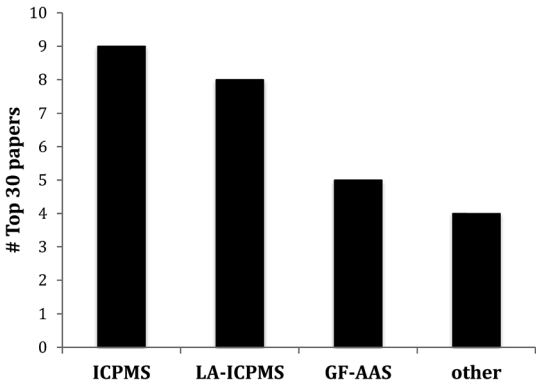


Fig. 2 Distribution of Top 30 *JAAS* papers by analytical technique.

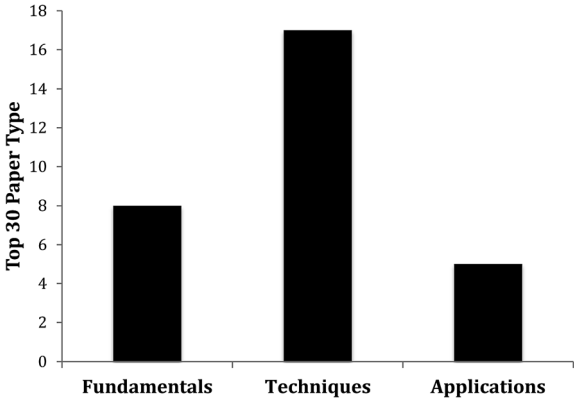


Fig. 3 Top 30 *JAAS* papers by paper type.

Table 2 Top 30 most cited *JAAS* papers, 1986–2015

Rank	Top 30 cited papers	Citations
1 (6)[a]	Laser Ablation Inductively Coupled Plasma Mass Spectrometric Transient Signal Data Acquisition And Analyte Concentration Calculation. By: H. P. Longerich, S. E. Jackson and D. Günther, *JAAS*, 1996, **11**, 899–904.	658
2	HF ISOTOPE RATIO ANALYSIS USING MULTI-COLLECTOR INDUCTIVELY COUPLED PLASMA MASS SPECTROMETRY: AN EVALUATION OF ISOBARIC INTERFERENCE CORRECTIONS[b]. By: N. C. Chu, R. N. Taylor, V. Chavagnac *et al.*, *JAAS*, 2002, **17**, 1567–1574.	399
3 (13)	Capabilities Of An Argon Fluoride 193 Nm Excimer Laser For Laser Ablation Inductively Coupled Plasma Mass Spectrometry Microanalysis Of Geological Materials. By: D. Günther, R. Frischknecht, C. A. Heinrich *et al.*, *JAAS*, 1997, **12**, 939–944.	295
4 (1)	Solid Sampling In Electrothermal Atomic-Absorption Spectrometry Using Commercial Atomizers – A Review. By: C. Bendicho and M. T. C. de Loos-Vollebregt, *JAAS*, 1991, **6**, 353–374.	285
5 (3)	Interferences In Inductively Coupled Plasma Mass-Spectrometry – A Review. By: E. H. Evans and J. J. Giglio, *JAAS*, 1993, **8**, 1–18.	283
6 (17)	Precision And Accuracy In Isotope Ratio Measurements By Plasma Source Mass Spectrometry. By: K. G. Heumann, S. M. Gallus, G. Radlinger *et al.*, *JAAS*, 1998, **13**, 1001–1008.	239
7	CARBON-ENHANCED INDUCTIVELY-COUPLED PLASMA-MASS SPECTROMETRIC DETECTION OF ARSENIC AND SELENIUM AND ITS APPLICATION TO ARSENIC SPECIATION. By: E. H. Larsen and S. Sturup, *JAAS*, 1994, **9**, 1099–1105.	235
8	ENHANCED SENSITIVITY IN LASER ABLATION-ICP MASS SPECTROMETRY USING HELIUM-ARGON MIXTURES AS AEROSOL CARRIER. By: D. Günther and C. A. Heinrich, *JAAS*, 1999, **14**, 9, 1363–1368.	230
9	EFFECT OF PARTICLE SIZE DISTRIBUTION ON ICP-INDUCED ELEMENTAL FRACTIONATION IN LASER ABLATION-INDUCTIVELY COUPLED PLASMA-MASS SPECTROMETRY By: M. Guillong and D. Günther, *JAAS*, 2002, **17**, 831–837.	228
10 (5)	Palladium Nitrate Magnesium-Nitrate Modifier For Electrothermal Atomic-Absorption Spectrometry: Performance For The Determination Of 21 Elements. By: B. Welz, G. Schlemmer and J. R. Mudakavi, *JAAS*, 1992, **7**, 1257–1271.	221
11 (2)	Matrix-Effect Observations In Inductively Coupled Plasma Mass–Spectrometry. By: S. H. Tan and G. Horlick, *JAAS*, 1987, **2**, 745–763.	220
12 (4)	Arsenic Speciation In Seafood Samples With Emphasis On Minor Constituents – An Investigation Using High-Performance Liquid-Chromatography With Detection By Inductively-Coupled Plasma-Mass Spectrometry. By: E. H. Larsen, G. Pritzl and S. H. Hansen, *JAAS*, 1993, **8**, 1075–1084.	212
13	LASER ABLATION INDUCTIVELY COUPLED PLASMA MASS SPECTROMETRY: ACHIEVEMENTS, PROBLEMS, PROSPECTS. By: S. F. Durrant, *JAAS*, 1999, **14**, 1385–1403.	209
14	DETERMINATION OF TOTAL AND SPECIATED ARSENIC IN RICE BY ION CHROMATOGRAPHY AND INDUCTIVELY COUPLED PLASMA MASS SPECTROMETRY. By: D. T. Heitkemper, N. P. Vela, K. R. Stewart *et al.*, *JAAS*, 2001, **16**, 299–306.	203
15 (7)	Fully Automated Dissolution And Separation Methods For Inductively Coupled Plasma Atomic Emission-Spectrometry Rock Analysis - Application To The Determination Of Rare-Earth Elements. By: K. Govindaraju and G. Mevelle, *JAAS*, 1987, **2**, 615–621.	203
16	METALLOMICS AS INTEGRATED BIOMETAL SCIENCE. By: H. Haraguchi, *JAAS*, 2004, **19**, 5–14.	196
17	COMMON-PB CORRECTED *IN SITU* U-PB ACCESSORY MINERAL GEOCHRONOLOGY BY LA-MC-ICP-MS. By: M. S. A. Horstwood, G. L. Foster, R. R. Parrish *et al.*, *JAAS*, 2003, **18**, 837–846.	196
18	QUANTITATIVE ANALYSIS OF MAJOR, MINOR AND TRACE ELEMENTS IN FLUID INCLUSIONS USING LASER ABLATION INDUCTIVELY COUPLED PLASMA MASS SPECTROMETRY. By: D. Günther, A. Audetat, R. Frischknecht *et al.*, *JAAS*, 1998, **13**, 263–270.	186
19 (8)	Palladium Nitrate – Magnesium-Nitrate Modifier For Graphite-Furnace Atomic-Absorption Spectrometry .2. Determination Of Arsenic, Cadmium, Copper, Manganese, Lead, Antimony, Selenium And Thallium In Water. By: B. Welz, G. Schlemmer and . R. Mudakavi, *JAAS*, 1988, **3**, 695–701.	174
20	MAGNESIUM ISOTOPE HETEROGENEITY OF THE ISOTOPIC STANDARD SRM980 AND NEW REFERENCE MATERIALS FOR MAGNESIUM-ISOTOPE-RATIO MEASUREMENTS. By: A. Galy, O. Yoffe, P. E. Janney *et al.*, *JAAS*, 2003, **18**, 1352–1356.	171
21	COMPARING SEVERAL ATOMIC SPECTROMETRIC METHODS TO THE SUPER STARS: SPECIAL EMPHASIS ON LASER INDUCED BREAKDOWN SPECTROMETRY, LIBS, A FUTURE SUPER STAR. By: J. D. Winefordner, I. B. Gornushkin, T. Correll, *et al.*, *JAAS*, 2004, **19**, 1061–1083.	164
22	MULTIWALLED CARBON NANOTUBES AS SOLID-PHASE EXTRACTION ADSORBENT FOR THE PRECONCENTRATION OF TRACE METAL IONS AND THEIR DETERMINATION BY INDUCTIVELY COUPLED PLASMA ATOMIC EMISSION SPECTROMETRY. By: P. Liang, Y. Liu, L. Guo *et al.*, *JAAS*, 2004, **19**, 1489–1492.	164
23 (9)	Flow-Injection Online Sorbent Extraction Preconcentration For Graphite-Furnace Atomic-Absorption Spectrometry. By: Z. Fang, M. Sperling and B. Welz, *JAAS*, 1990, **5**, 639–646.	163
24 (19)	Gas-Dynamics Of The Inductively Coupled Plasma Mass-Spectrometry Interface. By: D. J. Douglas and J. B. French, *JAAS*, 1988, **3**, 743–747.	161
25 (20)	Isotopic Ratio Measurement Using A Double Focusing Magnetic-Sector Mass Analyzer With An Inductively Coupled Plasma As An Ion-Source. By: A. J. Walder, P. A. Freedman, *JAAS*, 1992, **7**, 571–575.	159

Table 2 (*Contd.*)

Rank	Top 30 cited papers	Citations
26	QUANTITATIVE ANALYSIS OF TRACE ELEMENT ABUNDANCES IN GLASSES AND MINERALS: A COMPARISON OF LASER ABLATION INDUCTIVELY COUPLED PLASMA MASS SPECTROMETRY, SOLUTION INDUCTIVELY COUPLED PLASMA MASS SPECTROMETRY, PROTON MICROPROBE AND ELECTRON MICROPROBE DATA. By: M. D. Norman, W. L. Griffin, N. J. Pearson *et al. JAAS*, 1998, **13**, 477–482.	158
27 (10)	Investigations Of A Reduced Palladium Chemical Modifier For Graphite-Furnace Atomic-Absorption Spectrometry. By: L. M. Vothbeach and D. E. Shrader, *JAAS*, 1987, **2**, 45–50.	158
28	A CRITICAL ASSESSMENT OF LASER ABLATION ICP-MS AS AN ANALYTICAL TOOL FOR DEPTH ANALYSIS IN SILICA-BASED GLASS SAMPLES By: A. J. G. Mank and P. R. D. Mason, *JAAS*, 1999, **14**, 1143–1153.	156
29	ISOTOPE RATIO MEASUREMENT OF LEAD, NEODYMIUM AND NEODYMIUM SAMARIUM MIXTURES, HAFNIUM AND HAFNIUM LUTETIUM MIXTURES WITH A DOUBLE FOCUSING MULTIPLE COLLECTOR INDUCTIVELY COUPLED PLASMA MASS-SPECTROMETER. By: A. J. Walder, I. Platzner and P. A. Freedman, *JAAS*, 1993, **8**, 19–23.	155
30	SIGNAL ENHANCEMENT IN LASER ABLATION ICP-MS BY ADDITION OF NITROGEN IN THE CENTRAL CHANNEL GAS By: Z. Hu, S. Gao, Y. Liu, *et al., JAAS*, 2008, **23**, 1093–1101.	154
30 (12)	Determination Of Arsenic Species By High-Performance Liquid-Chromatography - Inductively Coupled Plasma Mass-Spectrometry. By: D. Beauchemin, K. W. M. Siu, J. W. McLaren *et al., JAAS*, 1989, **4**, 285–289.	154
30 (11)	Slurry Sample Preparation For Simultaneous Multi-Element Graphite-Furnace Atomic-Absorption Spectrometry. By: N. J. Miller-Ihli, *JAAS*, 1988, **3**, 73–81.	154

[a] 2006 rank in Top 20 *JAAS* publications.[1] [b] Paper titles in all caps are new (since 2006 listing) entries to top citation list.

classification by the author), development and technique papers still predominate over both fundamental and application type papers. Speciation papers (classified separately as a paper type in the 2006 review) have declined markedly since the last summary, due in large part to the emergence of the RSC journal *Metallomics* in 2009, where those papers are now more likely to be published.

The Top 30 papers are newly available on the *JAAS* blog website (http://rsc.li/jaas-30) in recognition of its 30th anniversary. The journal has now been around long enough to span the careers of many analytical atomic spectrometrists (including the author). The foresight of the original founders, and their assessment of the need for the journal has certainly been validated. Thank you, readers and contributors to the journal, for your steadfast support and participation in making *JAAS* a top 10 analytical journal. Now, onwards to 40, and then 50 years of publication!

David W. Koppenaal

References

1 D. W. Koppenaal, *J. Anal. At. Spectrom.*, 2006, **21**, 259–262.