

**John G. Brace**  
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#### **KEY EXPERIENCE/CAPABILITY**

My Ph.D. is in Analytical Chemistry and my job experiences relate to the practical areas of (i) food/beverage/product stability (shelf life) in plastic containers, (ii) modeling in package design and subsequent performance prediction/measurement of containers with barrier functionality (coatings, multilayer, scavengers, other active systems), and (iii) spectroscopic assessment of process effects on plastics (e.g., crystallinity and microstructure development in semicrystalline polymers, PECVD coatings on plastics).

#### **WORK HISTORY**

##### **The Whole Package LLC. Owner**

11/2016 to present (Saline, MI)

Providing consultancy to the plastics/packaging industry through development (materials strategies), analysis (materials signatures via NIR as well as broad method development) and prediction (licensed expert in M-Rule<sup>®</sup> Food Model container performance software).

##### **Amcor Rigid Plastics. Principal Scientist, Innovation (part-time)**

8/2016 to present (Manchester, MI)

Continuing support of Innovation/Engineering/Sales teams.

##### **Amcor Rigid Plastics. Principal Scientist, Innovation**

1/2009 to 6/2016 (Manchester, MI)

Performed extensive modeling work on active/passive/controlled-release barrier systems, integrated with actual performance measurements, and was contributor to Innovation/Engineering teams that commercialized numerous barrier packages (monolayer scavenger, plasma-coated, multilayer) in six application areas. Developed and applied technology screening and QC protocols based on rapid techniques (NIR, ATR, FTIR, ellipsometry, meniscus), while managing traditional (OTR, WVTR, CO<sub>2</sub>TR) permeation testing. Developed and applied screening/QC protocols for real-time Oxysense<sup>®</sup> package testing. Four patent applications and three issued US patents.

##### **Amcor PET Packaging. Senior Scientist: Process-monitoring deployment for heat-set PET, modeling/consultancy in high-performance packaging/shelf life, barrier-package commercialization, PET package evaluation**

11/2006 to 12/2008 (Manchester, MI)

Completed deployment of fleet of NIR systems to manufacturing plants (as QC tool for heatset PET crystallinity). Developed modeling protocols for rigid packages using M-Rule<sup>®</sup> software and led systematic modeling/validation efforts with Sales/Marketing and cooperating customers. Contributor to development team for multilayer package commercialization via nondestructive layer mapping, for process control/QC.

##### **Polymer Institute, University of Toledo. Research Professor: Original research, contract research and testing, and teaching in the area of molecular transport in polymeric systems**

2000 to 2006 (Toledo, OH)

Maintained and managed a permeation research lab. Pursued original research in controlled-release polymeric systems. Extensive material analysis and testing in closure systems, films and containers for industrial clients. Experience with barrier coatings, scavenger systems, copolymers and polymer blends, high-T<sub>g</sub> polymer systems and a diversity of diffusion/permeation measurements. Taught a graduate course on transport in polymers, advised graduate students and supervised several theses.

## John G. Brace

**Schmalbach-Lubeca Plastic Containers USA. Senior Member Technical Staff: Project management responsibility and consultancy in barrier polymers, high-performance packaging, shelf life, PET package evaluation**

1997 to 2000 (Manchester, MI)

Performed extensive work on active and passive barrier systems. About 40% of my time in 1999 was spent in Europe in the context of bidirectional Europe/US transfer of barrier and heatset technologies. Worked with Sales and Marketing as part of customer interface team in furtherance of PET development for food packaging. Extended the application of near-infrared spectroscopy (NIR) to multilayer containers (as lab R&D tool) and to heatset container manufacturing plants (as QC tool). Developed quantitative shelf-life methodology for linking sensory and analytical attributes of foods to barrier performance in plastic packages.

**Plastics Technology Group, Johnson Controls, Inc. Senior Member Technical Staff: Project management responsibility and consultancy in areas of divisional interest, e.g., barrier polymers, PET package evaluation, polymer degradation**

1994 to 1997 (Manchester, MI)

Formulated and implemented a spectroscopic mapping technique and system for container inspection, for obtaining material distribution, resin composition, and local and whole-package properties. Developed spectroscopic model for predicting barrier performance of semicrystalline polymers, and expertise in estimating shelf-life of packaged beverages and foods. Established permeation test facilities and database for O<sub>2</sub>, CO<sub>2</sub> and WVTR. Devised a fiber-optic NIR probe for carbonated beverage/package monitoring. Implemented a headspace GC protocol for residual volatiles (acetaldehyde) in PET resin, preforms and water. Several patents issued; several patent applications.

**Central Research Laboratory, Johnson Controls, Inc. Senior Member Technical Staff: Project management responsibility and divisional interface in areas of corporate technical interest, e.g., barrier coatings, fiber-optic and acoustic sensors**

1980 to 1994 (Milwaukee, WI)

Developed materials, configured devices and patented novel acoustic (SAW) sensor technology. Participated in a corporate/divisional research team focusing on thin-film barrier materials. Developed and patented a rapid spectroscopic method for predicting film properties. Developed proficiency in statistically designed experiments, surface and bulk analysis, permeation measurements and spectroscopy/reflectometry in visible, NIR and IR. Emphasis on quantitative IR via multivariate calibration techniques (PLS, PCR, K-matrix). Several external presentations, patents and publications.

### **EDUCATION/AWARDS**

**NSF/CNRS postdoctoral award (1979-80).** Research on optical properties of anodic oxides, at Université Paris VI, Paris, France.

**Ph.D., Analytical Chemistry, Purdue University (1979).** Area of specialization: surface analysis (XPS/SIMS).

**A.B., Chemistry, Wheaton College (1975).** ACS accredited program.

### **OTHER**

Fluent in French.

Member of Society of Plastics Engineers.

References and list of patents/presentations/publications available upon request.