

Painless Particles®

Quarterly Global Newsletter
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A DIVISION OF POLYSCIENCES, INC.

B E A D S ● A B O V E T H E R E S T™

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"On the Road Again!"

Tradeshaw Schedule: Stop by and see us!

❖ AACC Clinical Lab Expo. July 27-29, 2004. Los Angeles, CA. Booth: 3018. <http://www.aacc.org>

❖ The Latex Course™ 2004. September 26-29, 2004. San Diego, CA. <http://www.bangslabs.com/2004latexcourse>

**Quantum™ MESF
APC Kit will soon be
available. Please
contact us for more
information.**

PolyLink Protein Coupling Kit

Making it Even Easier to Use Our Beads!

Bangs Laboratories now offers Polysciences' PolyLink Protein Coupling Kit for covalent attachment of proteins to carboxyl (COOH) modified microspheres. The kit contents are sufficient for 50 coupling reactions using 1µm+ polymer (or magnetic) microspheres and 200-500µg of protein per reaction.

Water Soluble Chemistry

When the microsphere carboxyl groups are activated with water-soluble carbodiimide, they become highly reactive toward primary amines on the protein of interest. A step-by-step procedure is provided in our Technical Data Sheet 644, *PolyLink Protein Coupling Kit for COOH Microspheres*, (which may be downloaded from our website). Everything you need has been combined into one easy-to-use kit!

Kit Components:

PolyLink Coupling Buffer
PolyLink Wash/Storage Buffer
PolyLink EDAC (Carbodiimide)

Given that it's race season in Indianapolis, we decided to take it for a test drive, ourselves. We found that it handled beautifully!

So there you have it... Painless Particles – just like we said.

The Latex Course™ 2004 "Designing Microsphere-Based Tests and Assays"

The 2004 Latex Course will be held September 26-29, 2004, on beautiful Coronado Island (across the bay from San Diego) at the **Loews Coronado Bay Resort** (<http://www.loewshotels.com/hotels/sandiego>). The Latex Course Brochure (outlining pertinent information, such as program description, speakers & topics, hotel reservations, travel, and registration) will be mailed in June. But, here is a preview of what to expect:

What: The Latex Course is a microsphere education extravaganza! Experts in various fields will share their knowledge with attendees through organized lecture, discussion, and exhibits. Microsphere-based topics to be covered include assay development, application, characterization, manufacture, immobilization strategies, fluorescence quantitation, quantitative flow cytometry, cell separation, and more.

Cost: \$1,375 if paid by 7/31/04; \$1,475 thereafter (VISA and MasterCard accepted). Cost includes reception, conference dinner aboard the WWII-era aircraft carrier **USS Midway** (<http://www.midway.org>), breakfasts, and lunches. Attendees will receive the **2004 Latex Course Book** along with copies of the lectures for future reference.

Bring your microsphere questions for discussion. We look forward to seeing you there!

BioMag® Solutions

Antibody Purification from Serum or Cell Culture Supernatant

BioMag®Plus Antibody Isolation Kits are ideal for the purification of antibody from serum or cell culture supernatant. BioMag particles allow separations that are:

- **Faster than column formats** (You won't be isolated in the lab for long hours. [heh, heh])
- **Highly efficient** (Just in time for that upcoming performance review.)
- **Economical** (Who knows - maybe you'll get a raise.)

Our kits contain everything* that you'll need to get started, including:

- BioMag®Plus Protein A or Protein G magnetic particles
- Magnetic separator (1.5mL tube)
- Microcentrifuge tubes
- Wash, binding, elution, and neutralization buffers
- Detailed protocol

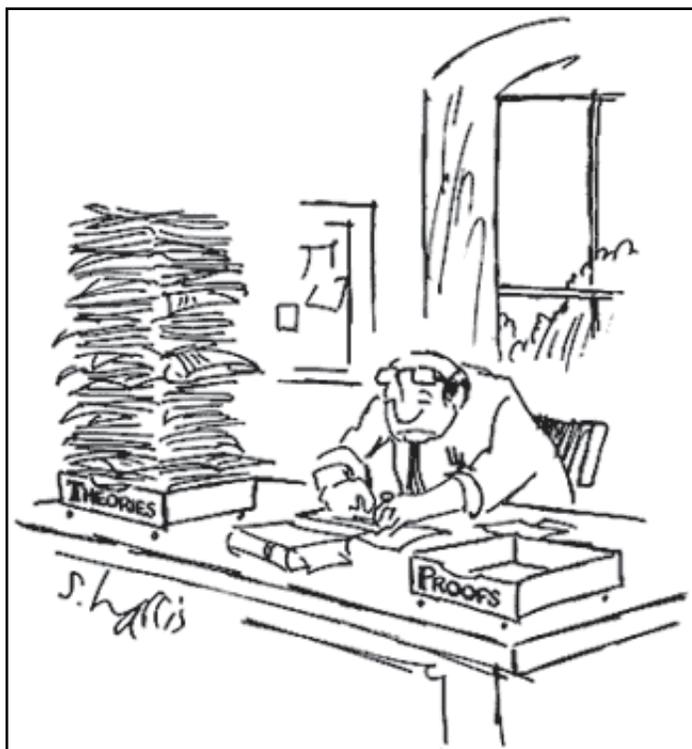
* OK, so they contain nearly everything that you'll need. We're not supplying the lab tech. Or the blood samples. And we've demonstrated again and again that we're not very cultured, so you probably wouldn't want our cells...

Bangs Laboratories and BioMag - we're here for you!**

** Subject to the aforementioned restrictions and limitations.

BP614 BioMag®Plus Protein A Antibody Isolation Kit

BP618 BioMag®Plus Protein G Antibody Isolation Kit



P(articles)₂ = Particle Articles

❖ Artificial Antigen-Presenting Cells

Walter S, et. al. (2003) Cutting Edge: Predetermined avidity of human CD8 T cells expanded on calibrated MHC/anti-CD8-coated microspheres. J Immunol; 171:4974-78.

Artificial antigen-presenting cells (aAPCs) were generated by immobilizing biotinylated MHC molecules to co-stimulatory anti-CD28 antibodies to **Bangs' ProActive® 5.6µm streptavidin-coated microspheres**. The bead aAPCs were used to selectively elicit high- or low-avidity antigen CTL responses with high efficiency.

❖ Bead-Based Superquenching Protease Sensor

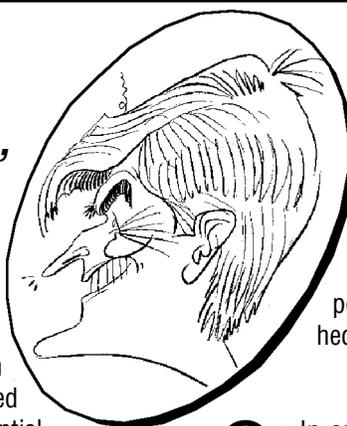
Kumaraswamy S, et. al. (2004) Fluorescent-conjugated polymer superquenching facilitates highly sensitive detection of proteases. PNAS; 101(20):7511-15.

Sensors for protease activity have been developed using **Bangs' ProActive® 4.6µm streptavidin-coated microspheres**.

← **Put your theories into practice with Bangs Beads!**

Please contact us or visit us online for more information about our **BEADS • ABOVE THE REST™**. (Cartoon reprinted with special permission from Sidney Harris <SHarris777@aol.com> and www.sciencecartoonsplus.com.)

Ask "The Particle Doctor"®



Q : Do you have any products that are suitable for selecting recombinant antibodies from a large antibody phage library?

A : **Magnetic microparticles** have been utilized with success for efficient selection of surface-displayed molecules from phage and yeast libraries. Sequential magnetic bead and flow cytometric sorting has also been reported. A few pertinent references follow:

Feldhaus M.J., et. al. 2003. Flow-cytometric isolation of human antibodies from a nonimmune *Saccharomyces cerevisiae* surface display library. *Nature Biotechnology*, 21:163-170.

McConnell S.J., et. al. 1999. Biopanning phage display libraries using magnetic beads vs. polystyrene plates. *Biotechniques*, 26(2):208-210, 214.

Yeung Y.A., K.D. Wittrup. 2002. Quantitative screening of yeast surface-displayed polypeptide libraries by magnetic bead capture. *Biotechnol Prog*, 18(2):212-220.

We offer **BioMag®** microparticles with a number of coatings for affinity binding (e.g. secondary antibody, streptavidin, protein A, etc.), in addition to **BioMag®** and **COMPEL™** functionalized microparticles for covalent attachment of capture molecules. See TechNote 102 for information on particle characteristics.

Q : I would like to couple antibody to microspheres, but I haven't worked with beads before. What do you suggest?

A : Using our custom coating service, naturally. Seriously, although we do offer a custom coating service, we do have products that are intended to introduce users to the wonderful world of microsphere coating in a relatively painless manner.

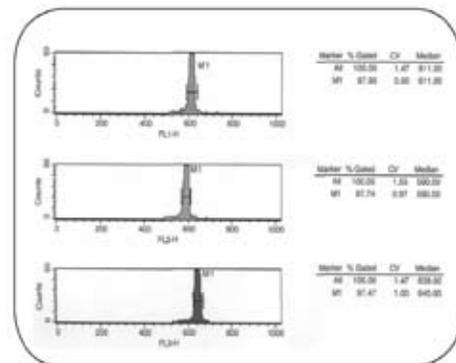
Our new **PolyLink Protein Coupling Kit** includes EDAC (for activation of -COOH surface groups on microspheres), coupling buffer, and wash/storage buffer. The accompanying protocol (Technical Data Sheet [TDS] 644) has been optimized for use with polymer microspheres 1µm and larger.

We also offer coupling kits featuring **BioMag® Plus Carboxyl** (see TDS 618) or **Amine** (see TDS 617) particles, and a **BioMag® Magnetic Immobilization Starter Kit** that includes a magnetic separator, reaction flask, particles, and buffers (see TDS 546). Our TechNotes 201-206 provide additional support on a range of topics related to microsphere handling.

Simply select the microspheres and/or kit that best meet your needs, review the coupling protocol and pertinent TechNotes, and you'll be off and running. Or, heck, join us at **The Latex Course™**.

Q : In our flow lab, we run calibration beads daily to verify instrument sensitivity and adjust detector settings. I'm wondering if we should also periodically run reference beads as a check on optical alignment and which ones would be best?

A : Our **Full Spectrum™** microspheres are internally labeled with multiple fluorophores to excite from the **UV** to the **near IR**, and emit over the full range. This product is suitable for instruments with single or multiple lasers, and may be used to check the alignment of all of the lasers and PMTs.



Histogram showing fluorescence and narrow CV's of the Full Spectrum™ (Catalog Code 885) standard.



Mail Bonding

(Subscribers "do the 'write' thing"!)

- ❖ "I am writing about FITC-beads that we purchased custom-made from you last year. The beads worked beautifully for my project. Thank you so much!" (Anonymous)
- ❖ "I would just like to point out that your website is very useful and user friendly. Many thanks." (AH, United Kingdom)
- ❖ "I would like to pass on thanks for the assistance you gave our investigator. His project is going well, and he's a great fan of QuickCal on the Internet." (AL, United Kingdom)

"Doubt is an uncomfortable condition, but certainty is a ridiculous one." –Voltaire

Technical References – See our website (www.bangslabs.com) for "downloadable" TechNotes and Product Data Sheets or ask for copies by mail or fax. We continually update and add new TechNotes and Product Data Sheets to our website.

Product-Specific TechNotes:

101. **ProActive® Microspheres** – Handling tips plus protocols for streptavidin, Protein A, and goat anti-Mouse coated microspheres.
102. **Magnetic Microparticles** – Characteristics, handling tips, and applications for superparamagnetic particles.
103. **Fluorescent/Dyed Microspheres** – Applications, fluorescence spectra, and product descriptions. Plus QuantumPlex™ microspheres for multiplexing, flow cytometry, and confocal microscope standards.
104. **Silica Microspheres** – For immunoassays, nucleic acid capture, velocimetry (LDV, PIV), flat panel display spacers, and others.
105. **Microsphere Size Standards** – Beads for cell size estimation, filter challenge, and instrument checks and calibrations. NIST-traceable standards from 0.27µm to 25µm.
106. **Confocal Standards** – Using our three, bright, single-label 60nm fluorescent beads in confocal microscopy.

Handling-Specific TechNotes:

201. **Working with Microspheres** – Choosing, cleaning, characterizing, coating beads, etc.
202. **Microsphere Aggregation** – Preventing, detecting, and reversing aggregation. Chemicals and equipment sources.
203. **Washing Microspheres** – Variety of methods for cleaning microspheres; advantages/disadvantages of methods; suppliers of equipment.
204. **Adsorption to Microspheres** – Adsorbing protein onto particles; use of "surface diluents" (blockers); recipes and references.
205. **Covalent Coupling** – Chemical attachment of proteins, nucleic acids, etc. to various types of surface-functionalized microspheres; recipes for buffers, blockers; miscellaneous coupling ideas, vendor information, and references.
206. **Equations** – For calculating particles/mL, area/g, "parking area", settling velocity @ 1G and in centrifuge, etc.
208. **Microsphere Sizing** – Various manual and automated methods are described and discussed, with references and supplier list.

Application-Specific TechNotes:

301. **Immunological Applications** – Review of commercial applications of microspheres.
302. **Molecular Biology** – Overview of purification and solid phase separation methods.
303. **Lateral Flow Tests** – Putting dyed particles on membranes so they will move properly.
304. **Light-Scattering Assays** – Turbidimetric and nephelometric applications of microspheres.

Reprints:

402. **Microspheres, part 1: Selection, cleaning, and characterization, and part 2: Ligand attachment and test formulation** – LB Bangs & Mary Meza, *IVD Technology (in Medical Device & Diagnostic Industry)*, **17**, #3, 18-26, March, and #4, 20-26, April, 1995. (Note that you can download these papers at the IVDT website: www.devicelink.com/ivdt/archive/95/03/009.html and [.../95/04/006.html](http://www.devicelink.com/ivdt/archive/95/04/006.html)).
403. **New Developments in Particle-Based Immunoassays** – Leigh B. Bangs, *Pure & Appl. Chem.*, **68**, #10, 1873-1879 (1996). Review of 40 years of diagnostic uses of microspheres – from LATs to biosensors.
405. **Applications of Magnetic Particles in Immunoassays** – Mary Meza, Ch. 22 (pp. 303-309) in *Scientific and Clinical Applications of Magnetic Carriers*, U. Häfeli, *et al*, Eds., Plenum Press, New York, 1997.
406. **Measuring Microsphere Binding Capacity** – JM Duffy, JV Wall, MB Meza, LJ Jenki, *IVD Technology*, **4**, #7, 28-34 (1988). (No reprints are available; you can download from our website.)
407. **Bead-based HTS Applications in Drug Discovery** – MB Meza, *Drug Discovery Today: HTS Supplement*, **1**, #1, 38-41 (2000).

Flow Cytometry Standards? See the "flow" portion of our website for lots of technical information about flow cytometry standardization in general and our expanding line of flow cytometry standards products in particular.

NEWEST TECHNICAL INFO AVAILABLE ON WEBSITE:

PolyLink Technical Data Sheet is available in support of our PolyLink Protein Coupling Kit. Feel free to download!

BLI Presentations and References See our website for copies of the latest public presentations by the technical people at BLI and for publications that cite use of Bangs Beads or were authored by BLI personnel.

If you aren't able to locate answers to your microsphere application or handling/use questions (within our TechNotes, PolyLink and BioMag® Technical Data Sheets, FAQs, References, Product Inserts, or Product Brochures), we invite you to call us directly, or to contact "The Particle Doctor®" through our website.