

ASSAY DEVELOPMENT

for Polymer, Magnetic & Fluorescent Microsphere Formats



Beads Above The Rest

WHO WE ARE...

Bangs Laboratories' 35 years of experience in microsphere synthesis and fine particle analysis have established us as a leading manufacturer of polymer, silica, and magnetic microspheres for laboratory instrument manufacturers and diagnostic assay developers. We understand the steps needed to get assays and platforms to market, and we have the products and the know-how to support you throughout the development and commercialization process. We manufacture at scales that will carry you from R&D through product launch and beyond, and under an ISO 13485:2016 Quality Management System that will meet your regulatory needs. Our proven synthesis and analytical methods ensure consistent manufacturing so that you receive microspheres made to specification time after time. If you require a product that is highly specialized, we are up to the challenge—our dyeing, coating, and surface modification expertise is demonstrated in our specialty products for bioseparations and instrument standardization. We are also pleased to offer custom formulations, concentrations, and packaging to support OEM and private label needs. Engage with us today and let us put our decades of real-world experience to work for you!



TURBIDIMETRIC ASSAYS

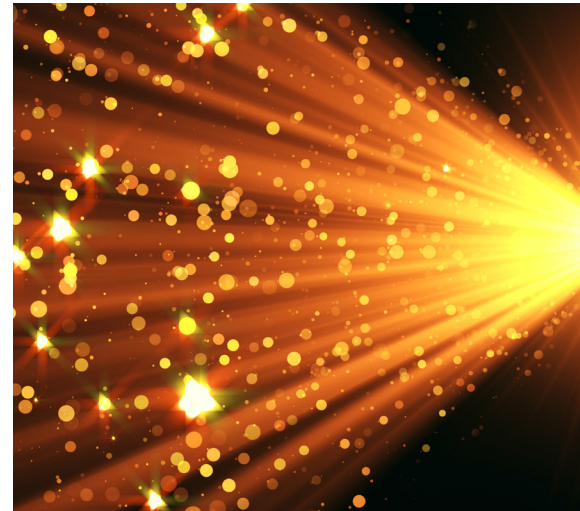
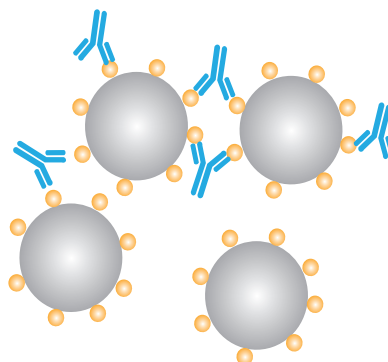
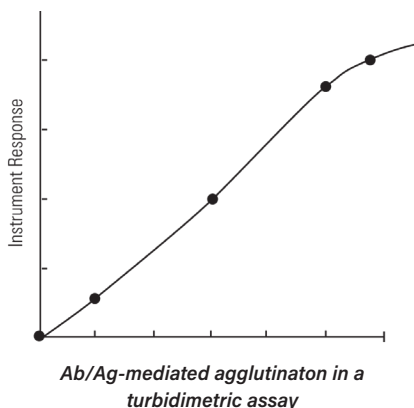
Assaying clinically relevant biomarkers is important to make informed decisions about conditions such as cardiovascular disease, thrombosis, bacterial infections, and active inflammatory conditions. Point-of-care (POC) turbidimetric assays are an important diagnostic tool, as they permit the rapid and sensitive measurement of disease-related biomarkers that may support decisions regarding the person's condition, prognosis, and treatment regimen.

Turbidimetric assays rely on the analyte-mediated agglutination of a suspension of ligand-coated particles. Changes in the light scattering properties of the suspension are monitored as the particles agglutinate into doublets, triplets, etc. Assays may be designed such that very small, poorly scattering spheres begin to scatter light more efficiently upon agglutination, or larger, more efficiently scattering particles fall out of suspension with agglutination.

For initial screening, our active inventory includes many carboxyl-modified latex (CML) particles in the range of 0.05-0.40 μm with different formulations, surfactant concentrations, and carboxyl (COOH) content. We additionally offer custom services and bulk manufacturing to meet highly specific needs.

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CARBOXYLATED POLYSTYRENE

Catalog Number	Nominal Diameter	Specification Range
PC02002	0.050 μm	0.040 - 0.060 μm
PC02003	0.070 μm	0.061 - 0.080 μm
PC02004	0.100 μm	0.090 - 0.110 μm
PC02005	0.125 μm	0.115 - 0.135 μm
PC02006	0.150 μm	0.140 - 0.160 μm
PC02007	0.175 μm	0.165 - 0.185 μm
PC02008	0.200 μm	0.190 - 0.210 μm
PC02009	0.300 μm	0.270 - 0.330 μm
PC02010	0.350 μm	0.340 - 0.360 μm
PC02011	0.400 μm	0.370 - 0.430 μm

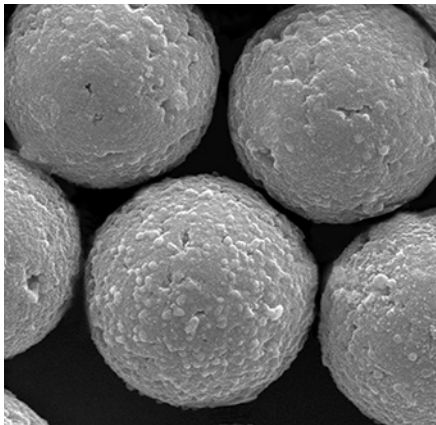
Our offerings include options for different levels of carboxylation.

Surface titer	Parking Area ($\text{\AA}^2/\text{COOH}$ group)
Low	60-100
Medium	35-59
High	10-34

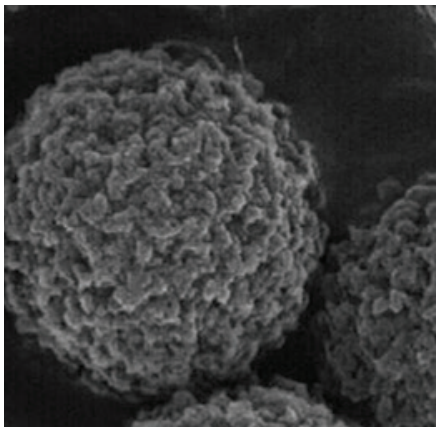
PLAIN POLYSTYRENE

Catalog Number	Nominal Diameter	Specification Range
PS02002	0.050 μm	0.040 - 0.060 μm
PS02003	0.075 μm	0.065 - 0.085 μm
PS02004	0.100 μm	0.090 - 0.110 μm
PS02005	0.125 μm	0.115 - 0.135 μm
PS02006	0.150 μm	0.140 - 0.160 μm
PS02007	0.175 μm	0.165 - 0.185 μm
PS02008	0.200 μm	0.190 - 0.210 μm
PS02009	0.300 μm	0.270 - 0.330 μm
PS02010	0.400 μm	0.370 - 0.430 μm

MAGNETIC PARTICLE ASSAYS



ProMag® HP



ProMag®

Bangs Laboratories' comprehensive range of superparamagnetic microparticles allows us to uniquely address a wide range of applications in the life sciences, including immunoassays, molecular assays, nucleic acid purifications, and other cellular & biomolecular isolations.

CHEMILUMINESCENCE ASSAYS

The high sensitivities, broad dynamic ranges, simple instrumentation, and rapid results that characterize chemiluminescence assays make them well-suited to quantitative measurement of low analyte concentration in immunological and molecular diagnostic applications. Whether developing assays for fully automated or laboratory-built analyzers, the solid phase is critical to a successful final product.

Both chemiluminescence (CL) and electrochemiluminescence (ECL) assays have featured a variety of magnetic particles as the solid phase to effectively capture the target, enhance sensitivity, and support automation. Bangs' line of magnetic particles are available in varying particle diameters, surface functionalities, morphologies, magnetic separation profiles, and other characteristics. We can also customize magnetic particles to provide the best profile for your assay. To facilitate particle selection and optimization, we have assembled Magnetic Sampler Packs featuring our most popular carboxyl (COOH) and streptavidin (SA) particles. See datasheets for additional product details.

REFERENCES

Acharya D, Bastola P, Le L, Paul AM, Fernandez E, Diamond MS, Miao W, Bai F. (2016) An ultrasensitive electrogenerated chemiluminescence-based immunoassay for specific detection of Zika virus. *Sci Rep*; 6:32227.

Dodeigne C, Thunus L, Lejeun R. (2000) Chemiluminescence as diagnostic tool. A review. *Talanta*; 51:415-439.

Fu Z, Yan F, Liu H, Lin J, Ju H. (2008) A channel-resolved approach coupled with magnet-captured technique for multianalyte chemiluminescent immunoassay. *Biosens Bioelectron*; 23:1422-1428.

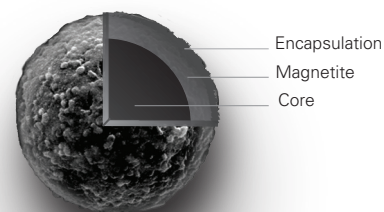
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Mahler M, Bentow C, Serra J, Fritzler MJ. (2016) Detection of autoantibodies using chemiluminescence technologies. *Immunopharmacol Immunotoxicol*; 38(1):14-20.

Zhang H, Yu D, Zhao Y, Fan A. (2014) Turn-on chemiluminescent sensing platform for label-free protease detection using streptavidin-modified magnetic beads. *Biosens Bioelectron*; 61:45-50.

MOLECULAR ASSAYS & NUCLEIC ACID ISOLATIONS

Molecular diagnostic assays require different characteristics for the nanoparticle components. Whether the assay is a colorimetric lateral flow test, multiplex suspension array, time-resolved fluorescence assay, next generation sequencing (NGS) analysis, or a new application, the nanoparticle characteristics influence the overall specificity and sensitivity of the assay. Some important magnetic bead characteristics include:

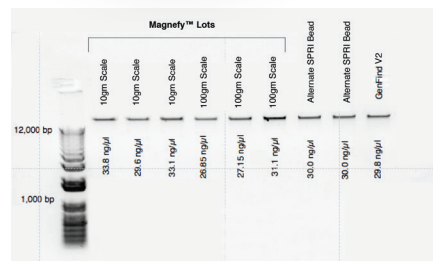


Surface topology, which varies from a rough encapsulated magnetite layer to a smooth surface amenable for flow cytometry or microfluidic devices.

Magnetic response, available in fast or slow separation profiles compatible with automation and/or sample density variations.

Multiple functional group coatings, such as amine, carboxyl, streptavidin, concanavalin A, protein A/G, secondary antibodies, azide, alkyne, and DBCO, that provide a flexible platform for covalent, high affinity, or highly specific click chemistry binding of your target.

We offer Magnetic Sampler Packs that feature a selection of particles that allow you to conduct side-by-side comparisons in the lab. We are also adept at helping investigators navigate the particle landscape to select candidates for screening based on the specific context such as assay format, instrument parameters, and other design criteria. We invite you to contact us with your questions regarding particle use in your diagnostic application.



SPRI-based DNA isolation using Magnefy COOH

REFERENCES

Fisher S, Barry A, Abreu J, Minie B, Nolan J, Delorey T M, et al. (2011). A scalable, fully automated process for construction of sequence-ready human exome targeted capture libraries. *Genome Biol*; 12(1), R1.

Meyer M, Stenzel U, Hofreiter, M. (2008). Parallel tagged sequencing on the 454 platform. *Nature Protoc*; 3(2), 267.

Elkin CJ, Richardson PM, Fourcade HM, Hammon NM, Pollard MJ, Predki PF, et al. (2001). High-throughput plasmid purification for capillary sequencing. *Genome Res*; 11(7), 1269-1274.

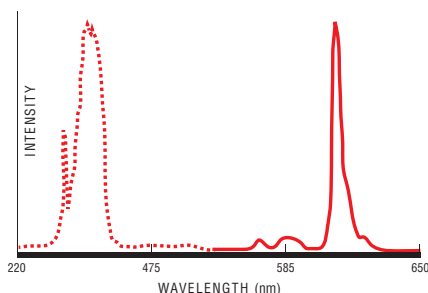
Hawkins TL, O'Connor-Morin T, Roy A, Santillan C. (1994). DNA purification and isolation using a solid-phase. *Nucleic Acids Res*; 22(21), 4543-4.

MAGNETIC PARTICLES FOR ASSAYS						
Catalog Number	Product Description	Nominal Diameter (µm)	Morphology	Composition	Surface Functionality	Datasheet
MFY0002, MFYS1N, CBMFY01, CBMFY02, CBMFY03, MFYM001	Magnefy™ Magnefy™ Mach I	1.0	spheroid	Polymer magnetic core, Encapsulated	COOH, Az, Alk, DBCO, SA, ConA	PDS 756 PDS 920
BP618, BP628	BioMag® BioMag®Plus	1.5	irregular cluster	Silanized iron oxide	Amine, COOH SA, ConA, WGA Oligo dT(20)	PDS 618, 621 PDS 716, 720 PDS 529
PMC1N, PMS1N	ProMag® 1 series	1.0	spherical	Polymer magnetic core	COOH, SA	PDS 715
PMC3N, PMS3N, CBPMC01, CBPMC02, CBPMC03	ProMag® 3 series	3.0	spherical	Polymer magnetic core	Amine, COOH, SA Az, Alk, DBCO	PDS 715 PDS 920
PMC3HP, PMS3HP	ProMag® HP	3.0	spherical	Polymer magnetic core, Encapsulated	COOH, SA	PDS 743
UMC0100, UMC0101, UMC0102	COMPEL™	3.0, 6.0, 8.0	uniform spherical	Polymer magnetic core Encapsulated	COOH, SA	PDS 705
MC07001	Magzilla™	30	spherical	Polymer core with internal magnetic layers	COOH	PDS 758
21940	Magnetic Streptavidin Sampler Pack	MFYS1N, Magnefy™ SA – 1 mL (1% solids) 10 mg/mL PMS1N, ProMag Series 1 SA – 1 mL (1% solids) 10 mg/mL PMS3HP, ProMag HP 3 µm SA – 1 mL (1% solids) 10 mg/mL BP628, BioMag®Plus SA – 2 mL (0.5% solids) 5 mg/mL			SA	PDS 749
21950	Magnetic COOH Sampler Pack	MFY0002, Magnefy™ – 5 mL (5% solids) 50 mg/mL PMC1N, ProMag® Series 1 – 5 mL (2.5% solids) 25 mg/mL PMC3HP, ProMag® HP 3 µm – 5 mL (2.5% solids) 25 mg/mL BP618, BioMag®Plus – 5 mL (2% solids) 20 mg/mL			COOH	PDS 749

Abbreviations: COOH, Carboxyl Group; Az, Azide; Alk, Alkyne, SA, Streptavidin; DBCO, Dibenzo cyclooctyne; Con A, Concanavalin A; WGA, Wheat Germ Agglutinin; Ab, Antibody.

NANOPARTICLES FOR LATERAL FLOW

Europium chelate (365, 610)



Lateral flow and other rapid tests fulfill important roles in the diagnostic landscape. Affordable and easy to use, they are particularly important for delivering diagnostic capability to programs with critical need, limited resources, or remote / de-centralized laboratories. Bangs Labs offers various colors of visibly dyed polystyrene particles & colloidal gold for colorimetric lateral flow and highly sensitive europium [EuIII] nanoparticles for time resolved fluorescence (TRF).

Bangs 40 nm gold nanoparticles are manufactured at large scale under our ISO 13485:2016 quality management system (QMS) to ensure consistency and traceability for the user. Our Ott Scientific partner, Ethos Biosciences is a CDMO for lateral flow assays that can help you move your R&D assay into commercial applications. See Lateral Flow Assay Components & Services and PDS 900 for additional information.

Our highly fluorescent EuIII nanoparticles offer exceptional functionality and stability for the development of your POC assay. They are used in highly sensitive assays for both lateral flow and microplate formats. The europium chelate complex possesses:

A longer fluorescence lifetime (μs) than traditional fluorophores (ns), allowing signal to be collected beyond the background fluorescence.

A long Stokes shift that ensures the incident light from the excitation source ($\lambda \sim 330\text{-}340 \text{ nm}$) does not interfere with collection of reporter signal by the detector ($\lambda \sim 610\text{-}620 \text{ nm}$).

These traits, coupled with the availability of small, portable TRF readers, present new opportunities in the evolution of rapid diagnostics. See datasheet 741 for additional product details.

EUROPIUM CHELATE		
Catalog Number	Description	Nominal Diameter
FCEU001	PS-COOH Europium Chelate	0.10 μm
FCEU002	PS-COOH Europium Chelate	0.20 μm
FCEU003	PS-COOH Europium Chelate	0.30 μm
FCEU004	PS-COOH Europium Chelate	0.40 μm
21960	Europium Chelate COOH Sampler Pack	0.10 μm , 0.20 μm , 0.30 μm , and 0.40 μm x 1mL

REFERENCES

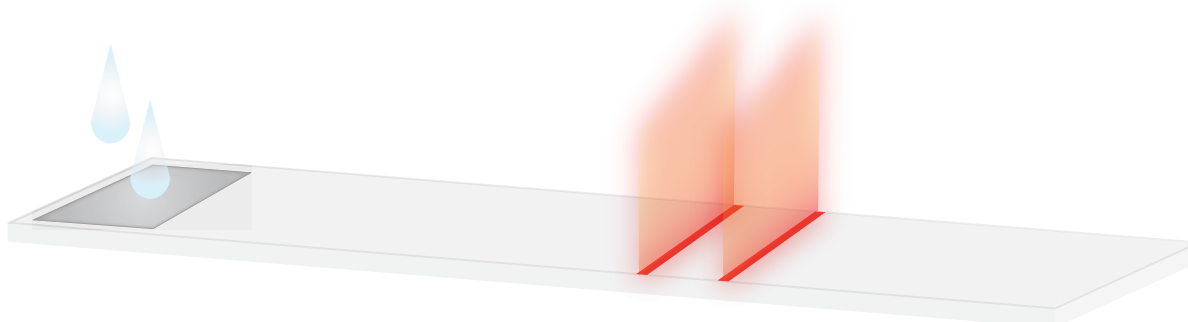
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AND THAT'S NOT ALL...

Bangs manufactures polymeric, silica, and superparamagnetic particles that are additionally offered with a variety of surface functional groups, visibly colored or fluorescent dyes, and affinity ligand coatings to meet the diverse needs of the diagnostics market. We synthesize at scales that will carry you from R&D through manufacturing, and under an ISO 13485 Quality Manufacturing System that will meet your regulatory needs.

We offer many types of particle standards and calibrators for laboratory instruments, including flow cytometers, particulate contamination detectors, cell viability counters, and more. Our Flow Cytometry products provide standardization and calibration tools that lead the industry in quantitative fluorescence detection.

If a product that you require is not listed here, please check out website www.BangsLabs.com as our offerings are continually expanding. For special requirements, please contact us regarding our custom bulk synthesis and OEM contract manufacturing services. We also provide many technical resources on our website such as curated references, TechNotes, infographics, and videos.

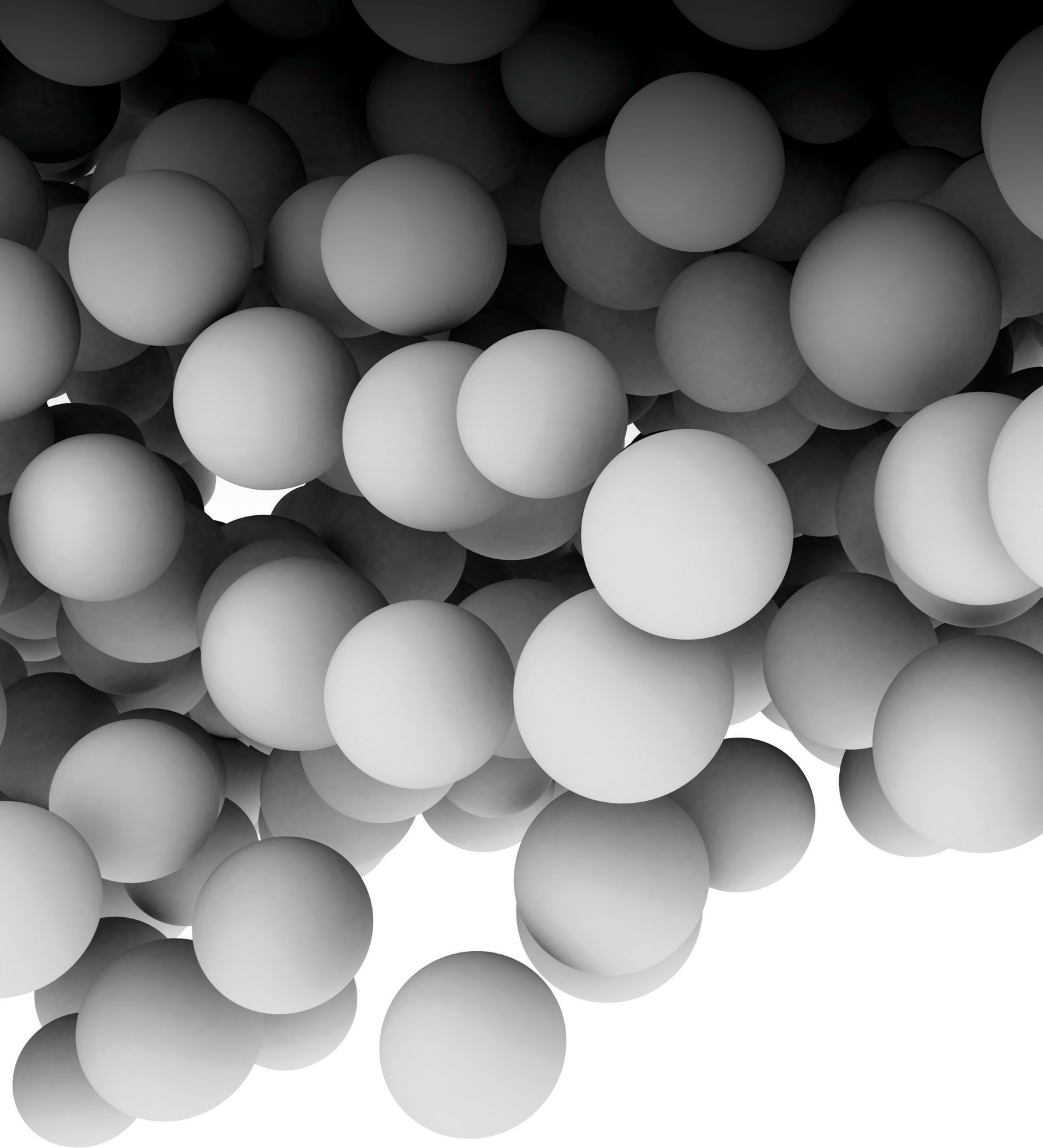
We are here for you - let us know how we can help.

TRADEMARKS

Polysciences, Inc. - Beads Above The Rest®, BioMag®, ProMag®

Bangs Laboratories, Inc. - Bangs Labs™, COMPEL™, Magnefy™, Magzilla™





Let's Connect



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