Technical note T02

The high purity of i-colloid Au

High purity matters.

Material purity is of crucial importance for biomedical applications. Although gold nanoparticles are generally considered nontoxic and biocompatible, impurities can be introduced during production process. Conventional chemical synthesis involves a variety of precursors, reducing agents, and stabilizers. Impurities present in a final product can include residual reactants, stabilizers, and preservatives. The high purity of IMRA's i-colloid Au is made possible by a pulsed laser ablation process, in which a bulk gold is fragmented into nanoparticles by a focused high power pulsed laser beam, therefore ensuring a reactant-free and stabilizer-free production.

Purity characterization: elemental analysis

The following elemental concentrations are analyzed using high sensitivity analytical methods:

Element	Method
Au	ICP-MS
Na, K, P	ICP-MS
Cl	Parr Bomb followed by Ion Chromatography
N	Kjeldahl nitrogen, distillation

Purity characterization: electrical conductivity

Electrical conductivity (κ) is a convenient and sensitive measurement that reflects the total ionic concentration of an electrolyte. The level of total dissolved solid (TDS) can be estimated following the relationship: 1 μS/cm of κ represents approximately 0.7 ppm of TDS.

Table 1. Purity comparison between 20 nm i-colloid Au and other products (all in OD 1)

Measurement	Unit	i-colloid Au	Product B	Product C
Au concentration	ppm	47	53	48
Na concentration	ppm	0.77	44	34
K concentration	ppm	<0.05*	36	1.7
P concentration	ppm	<0.05*	<0.05*	2.6
Cl concentration	ppm	0.77†	24	38
N concentration	ppm	<10*	<10*	<10*
Electrical conductivity (κ)	μs/cm	5	330	200

*: Below detection limit. †: Below detection limit. Number assumed from Na concentration.

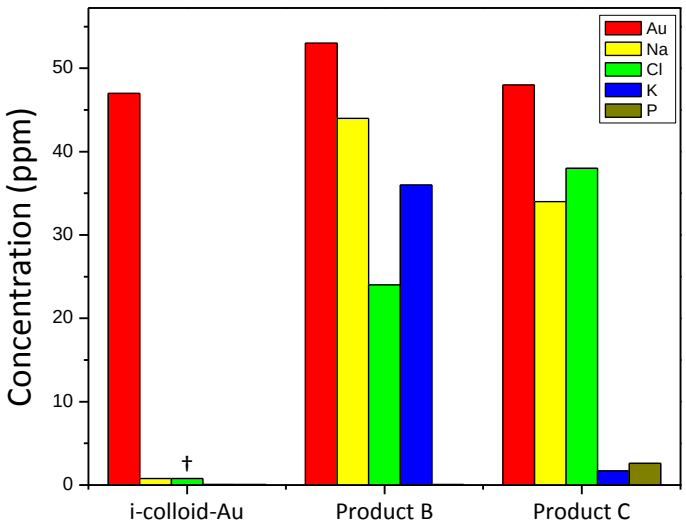

Fig. 1. Purity comparison between 20 nm i-colloid Au and other products (all in OD 1). (†: Below machine detection limit. Number assumed from Na concentration.)

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