Annex I. TEM images and histograms

MNPs synthesised in organic media were observed through TEM to analyse morphology and size distribution (Figure A1a). Water-soluble (coated with PMAO-TAMRA) and PEG functionalized nanoparticles were also analysed, to confirm that the inorganic core was not affected by the water transfer or functionalization protocols (Figure A1b). The polymer coating can be observed in these last cases.

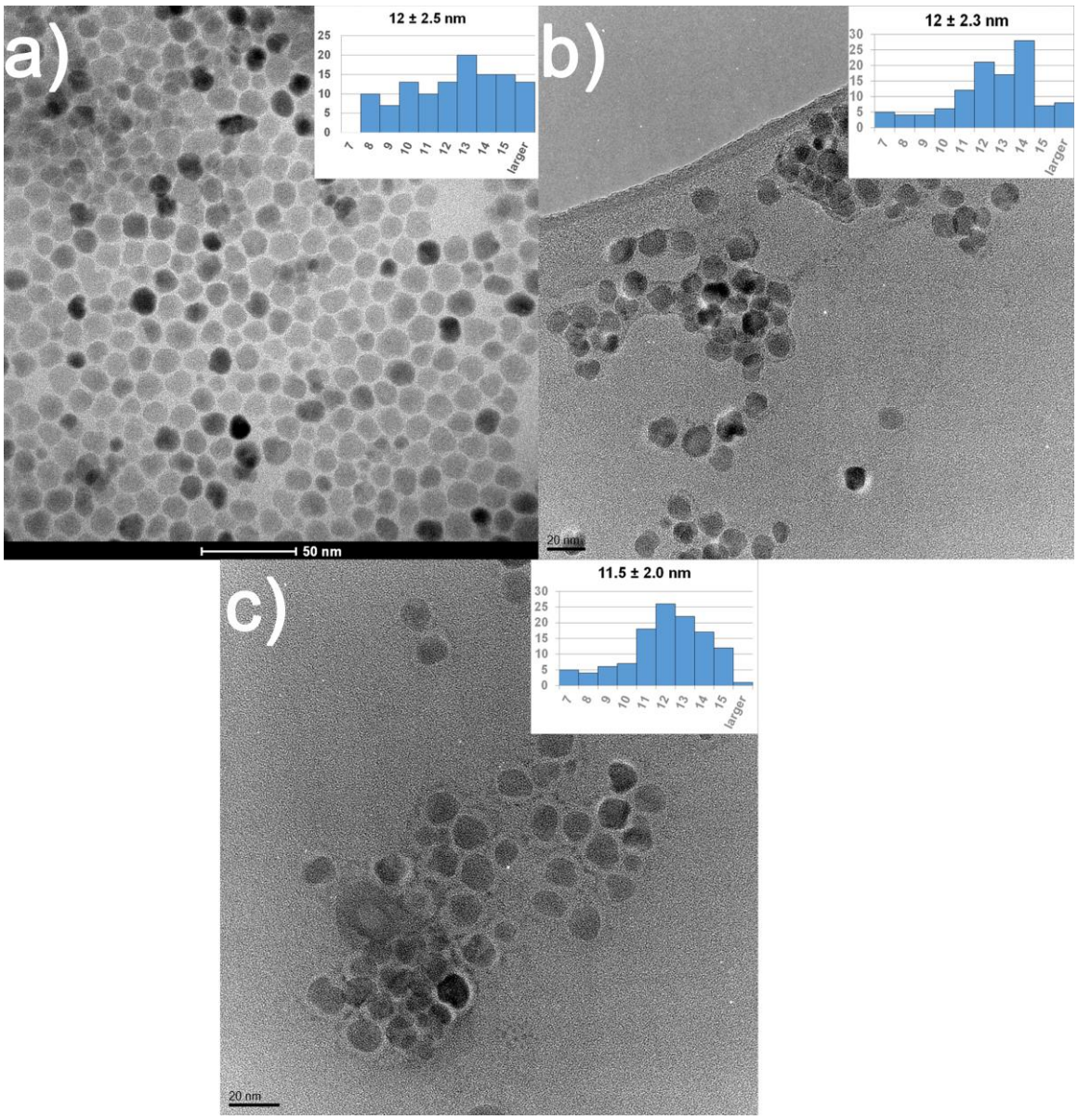

Figure A1. TEM images of (a) MNPs with oleate, soluble in organic media, (b) MNPs coated with PMAO-TAMRA and (c) MNPs coated with PMAO-TAMRA and functionalized with PEG. Scale bars: (a) 50 nm, (b) 20 nm.

Annex II. Thermogravimetric analysis and calculations

The graphic of the thermogram is shown in Figure A2, detailing the percentage corresponding to each organic layer. From this data, the carboxyl groups per nanoparticle can be estimated.

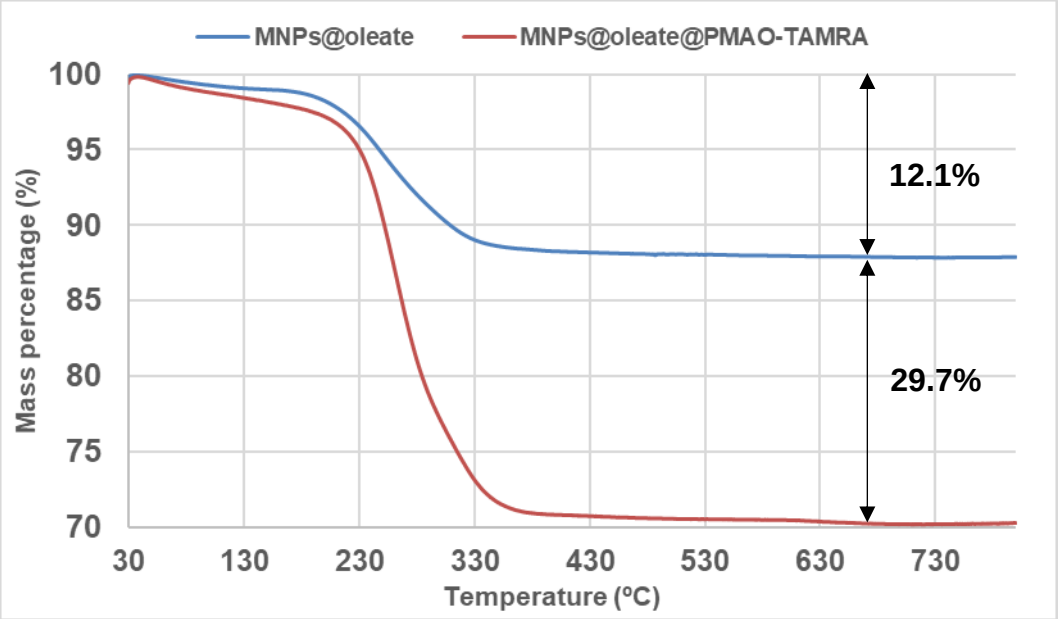

Figure A2. Thermogram of the MNPs soluble in organic media (MNPs@oleate, blue) and of the water soluble MNPs (MNPs@oleate@PMAO-TAMRA, red).

Considering that all MNPs are spherical with a diameter of 12 nm, their volume can be calculated: $9.05 \cdot 10^{-19}$ cm^3. Then, with the density (5.24 g/cm^3) the mass of a nanoparticle can be estimated as $4.74 \cdot 10^{-18}$ g. TGA provides the mass percentage of the PMAO-TAMRA (17.7%). Considering that, and the amount of oleic acid, the inorganic core of the MNPs is 70.26%.

With a calculation base of 1 g, we determine the number of monomers of PMAO-TAMRA per gram of sample:

$$Monomers = \frac{Relative\ mass\ (PMAO - TAMRA) \times Sample\ mass\ (g)}{Molecular\ weight\ (PMAO - TAMRA)(\frac{g}{mol})} \times N_A$$

$$= \frac{0.1763 \times 1}{350} \times 6.022 \cdot 10^{23}$$

$$= \mathbf{3.03 \cdot 10^{20}}\ \boldsymbol{PMAO\ monomers}/_{\boldsymbol{g\ sample}}$$

Then, the number of inorganic nanoparticles of the sample is calculated:

$$MNPs = \frac{Relative\ mass\ (inorganic\ core) \times Sample\ mass\ (g)}{Mass\ of\ a\ nanoparticle\ (g)} = \frac{0.7026 \times 1}{4.74 \cdot 10^{-18}}$$

$$= \mathbf{1.48 \cdot 10^{17}}\ \boldsymbol{NPs/_{g\ sample}}$$

The number of monomers of PMAO-TAMRA per nanoparticle is:

$$\frac{3.03 \cdot 10^{20}}{1.48 \cdot 10^{17}} = \mathbf{2.04}\ \boldsymbol{PMAO\ monomers/_{NP}}$$

Each monomer has an anhydride group that transforms into two carboxyl groups. Therefore, the number of carboxyl groups per nanoparticle is the double as the number of monomers: **4,080 carboxyl groups/nanoparticle**.

Annex III. Stability assay figure

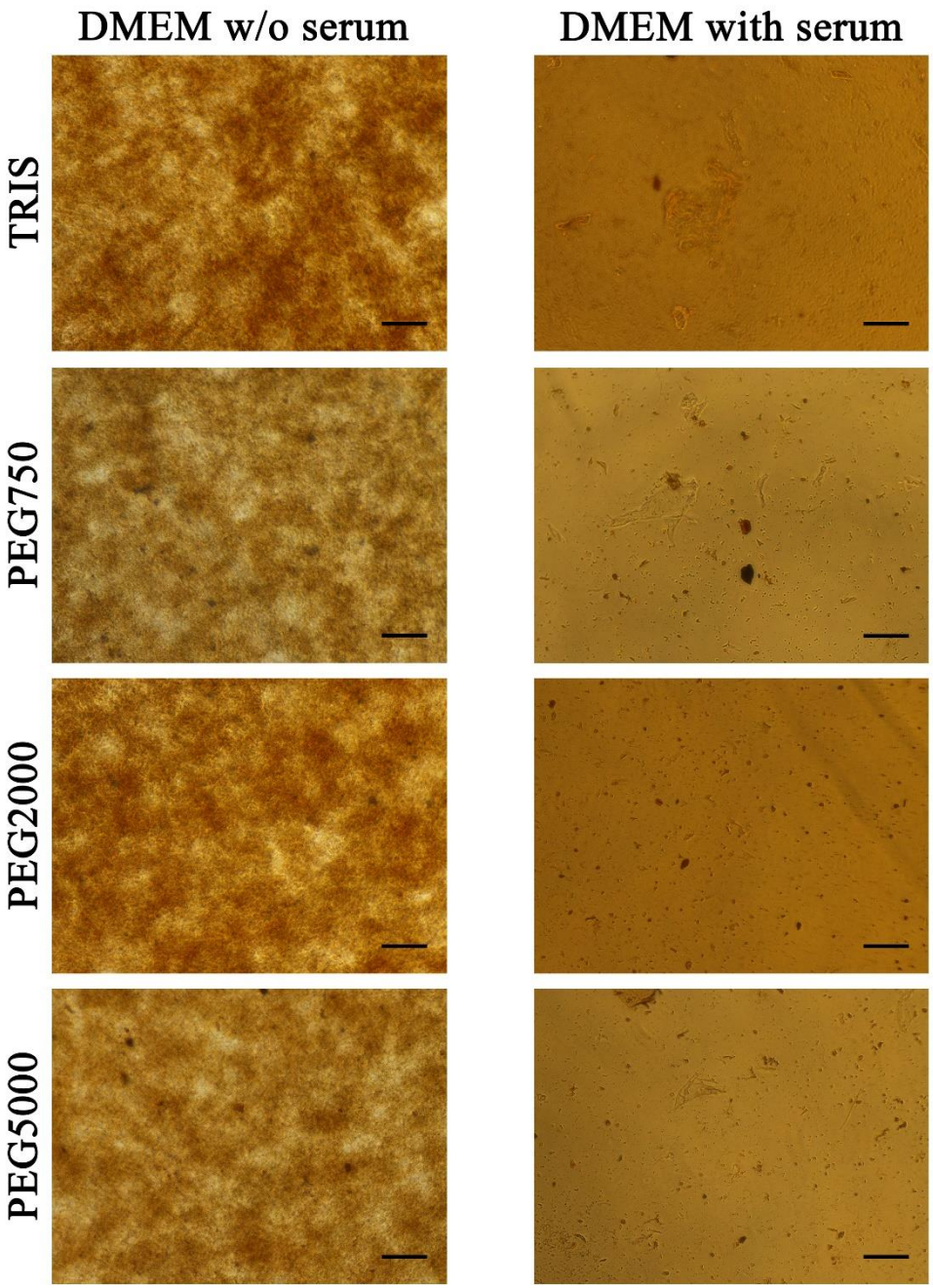

Figure A3. Stability assay of the differently passivated MNPs in culture media with and without FBS. The MNP:media volume ratio of the picture shown is 1:3. Scale bar: 50 μm.