Figure S1. A black and white image showing the commercial particles before a magnet was applied. The blue overlay is a user selected area of pixels. The same area is then used for successive images
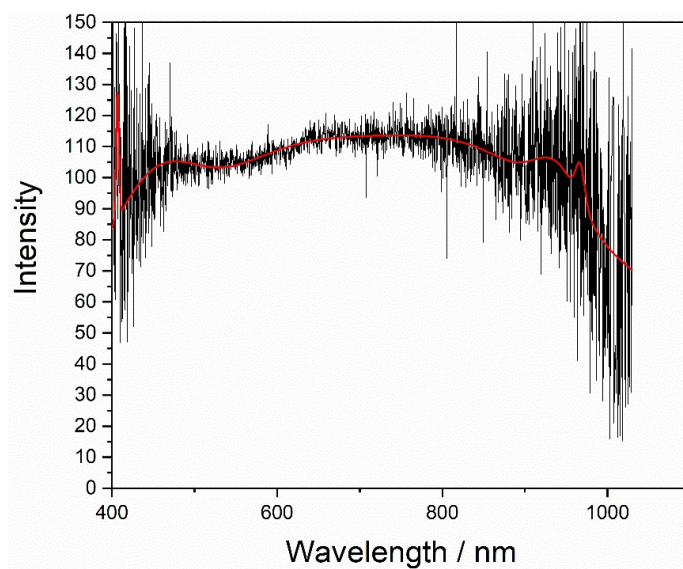

Figure S2. Graph of the raw data acquired from dark field single particle spectra (black) and the interpolated fit (red) from the origin multiple peak fit
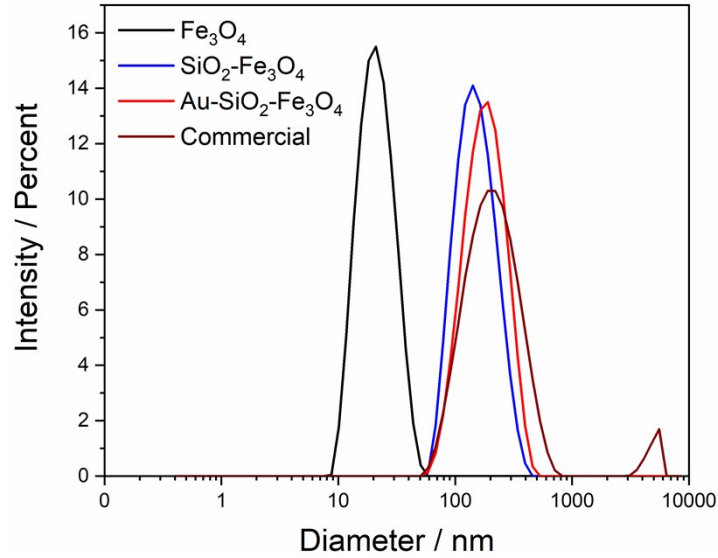
Figure S3. Dynamic light scattering (DLS) of Magnetite nanoparticles (black), Silica coated conglomerates of superparamagnetic nanoparticles (blue), gold coated conglomerates of superparamagnetic nanoparticles (red) and commercial gold coated magnetic nanoparticles (wine)
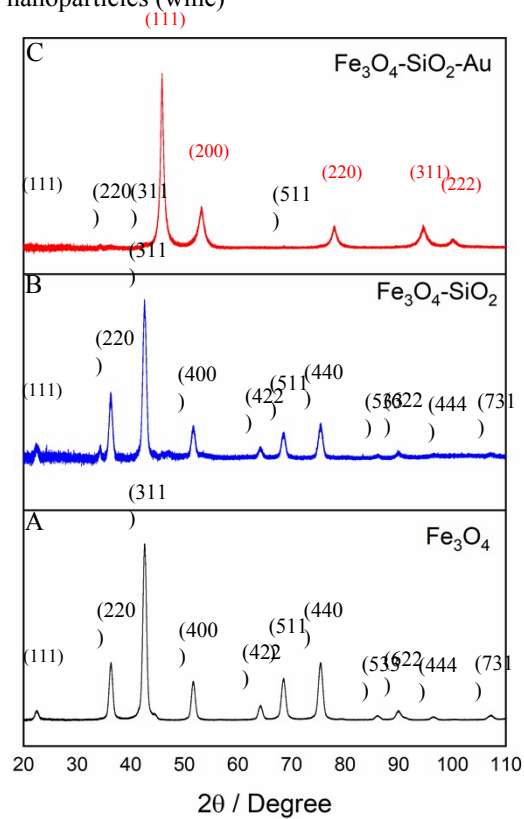

Figure S4. X-ray diffraction patterns of A) magnetite nanoparticles B) Silica coated conglomerates of superparamagnetic nanoparticles and C) gold coated conglomerates of superparamagnetic nanoparticles, with a representative index on typical peaks
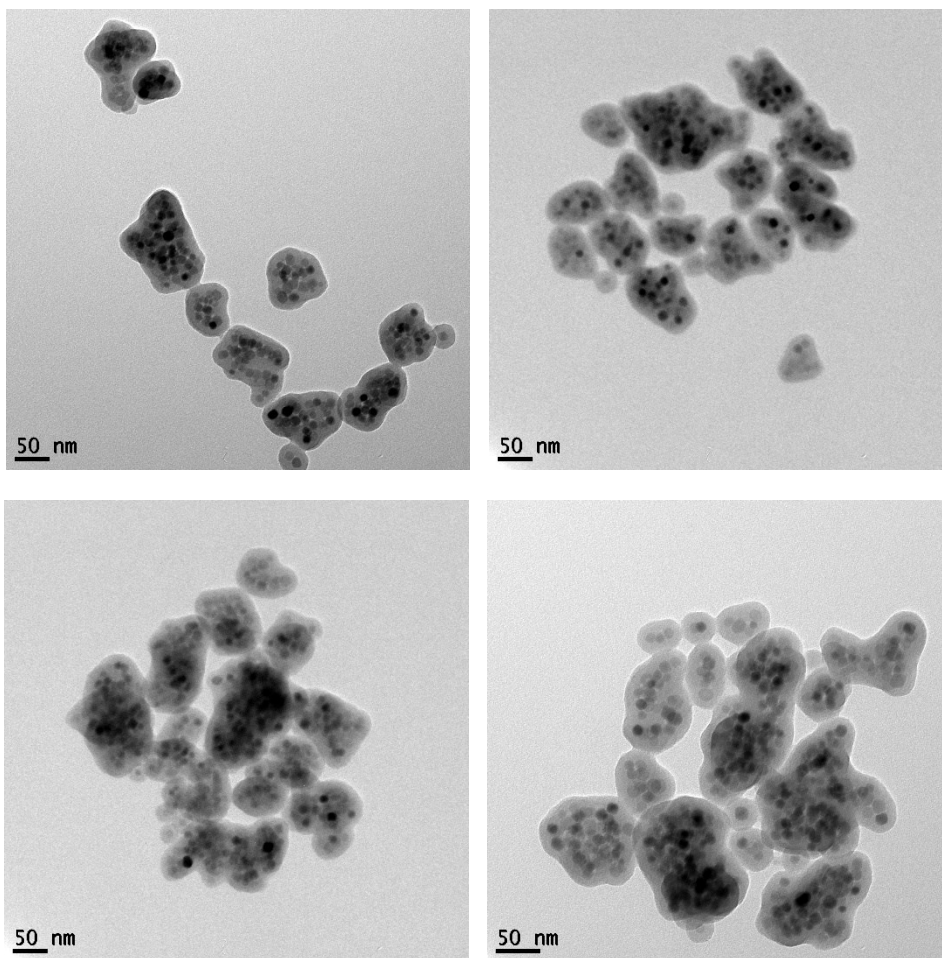
Figure S5.TEM images of silica coated conglomerates of superparamagnetic nanoparticles showing the high loads of magnetic nanoparticles inside silica shell
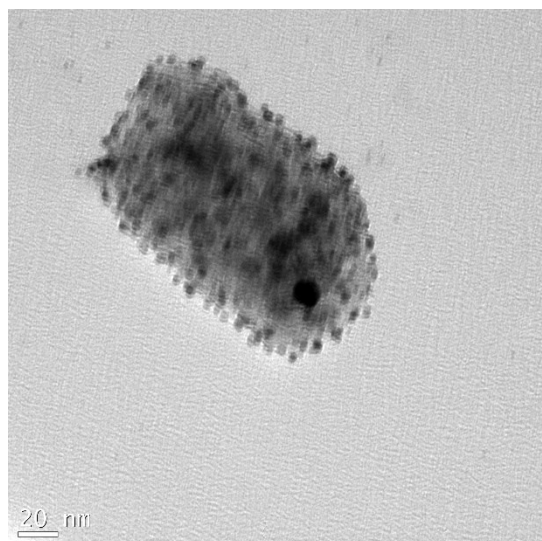

Figure S6. TEM image of gold nanoparticle decorated (<4 nm) silica coated conglomerates of superparamagnetic nanoparticles (black dots show the small gold nanoparticles)
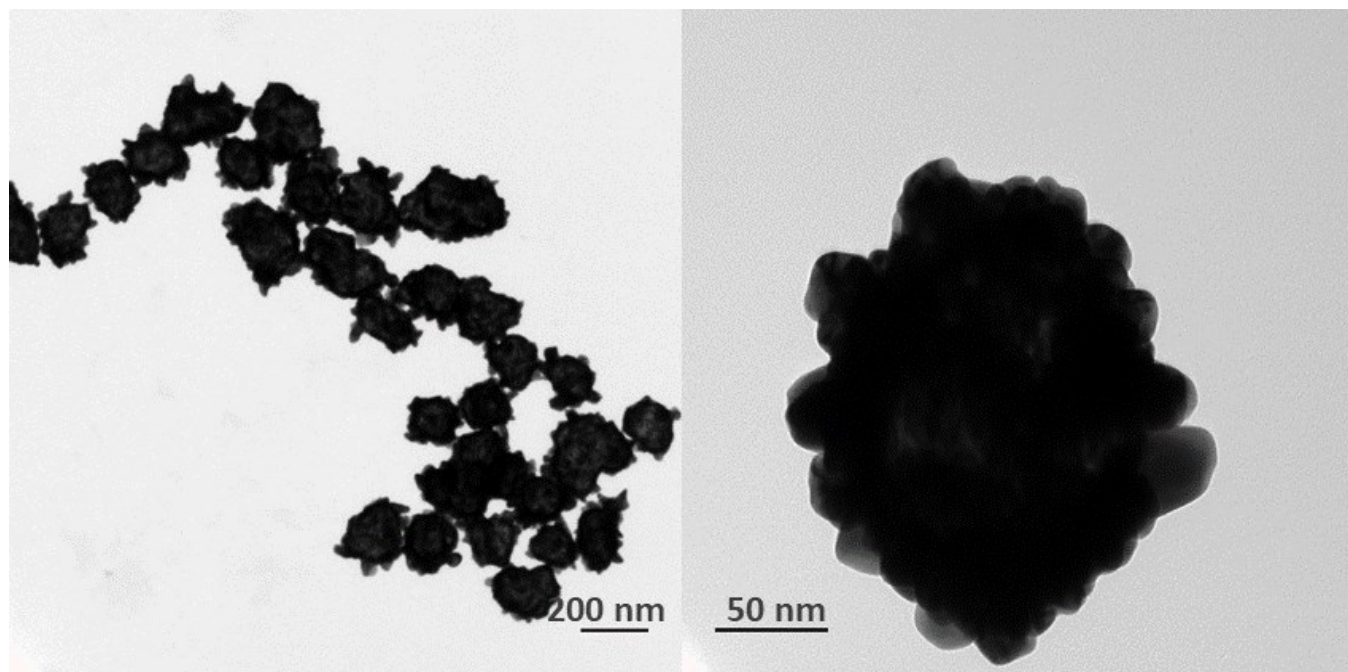
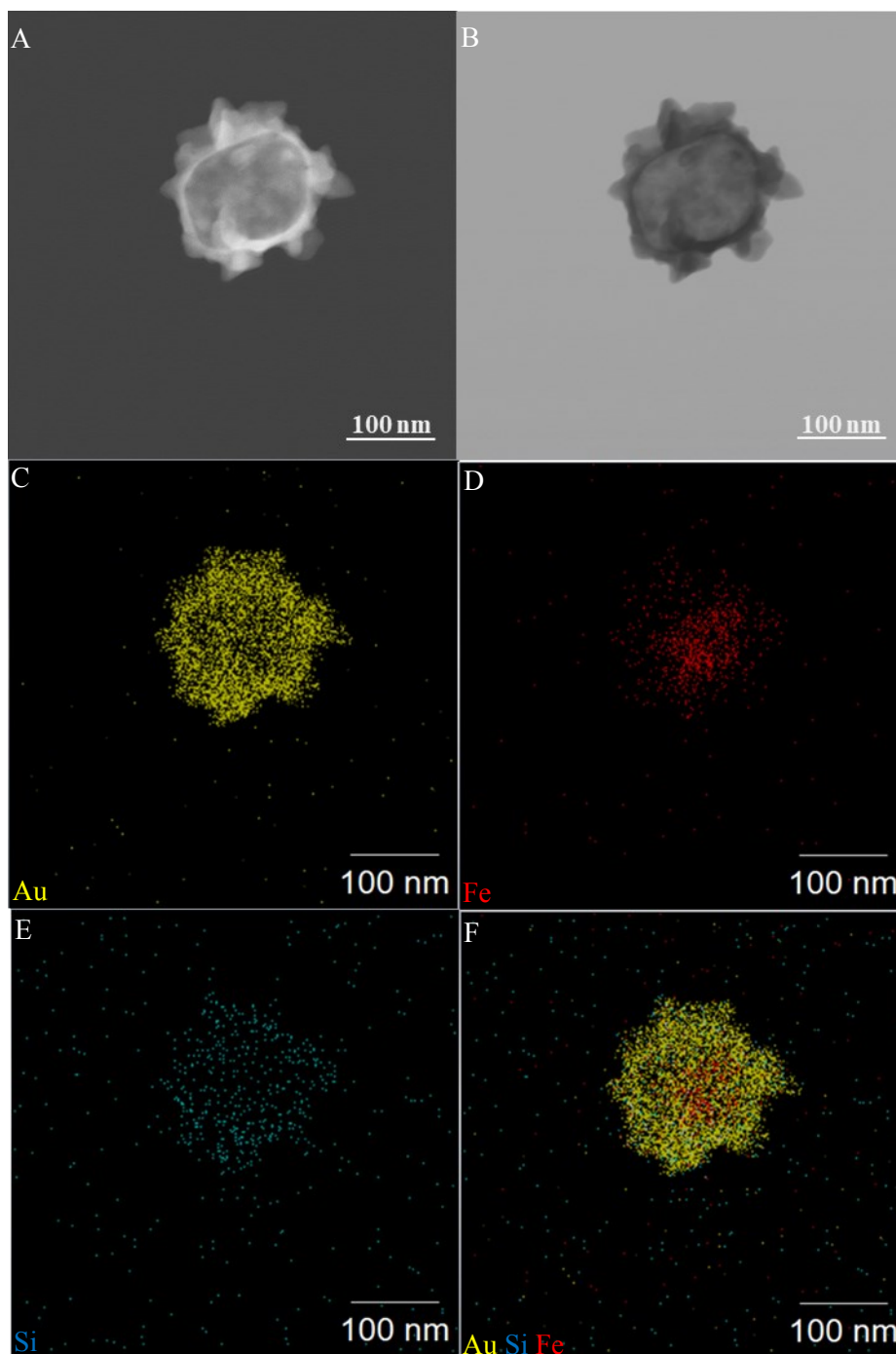**Figure S7**. TEM images of the gold coated conglomerates of superparamagnetic nanoparticles

Figure S8. A) Bright field, B) dark field STEM images and STEM-EDX map of the elements C) gold D) iron E) silicon and F) merged gold silicon and iron of the gold coated conglomerates of superparamagnetic nanoparticles
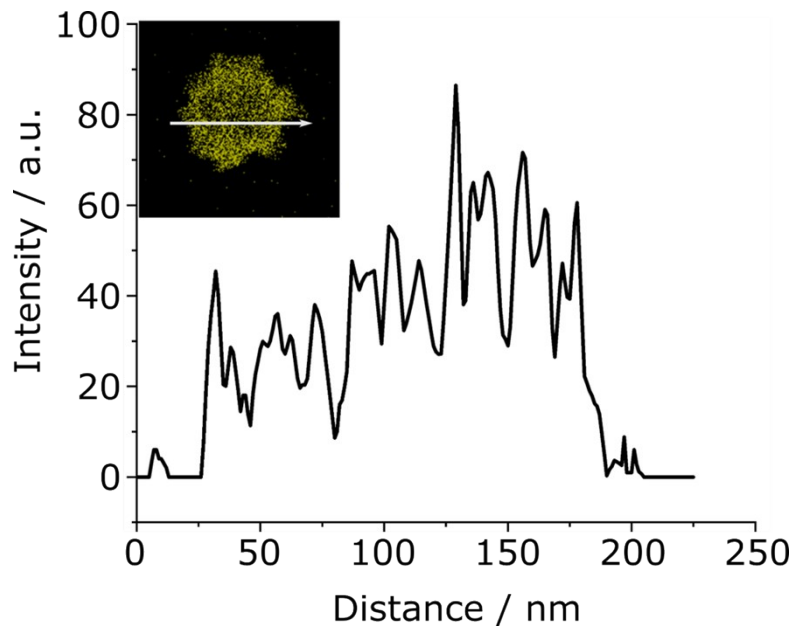
Figure S9. Line scan analysis of element gold of the gold coated conglomerates of superparamagnetic nanoparticles inset shows the EDX map of the element gold
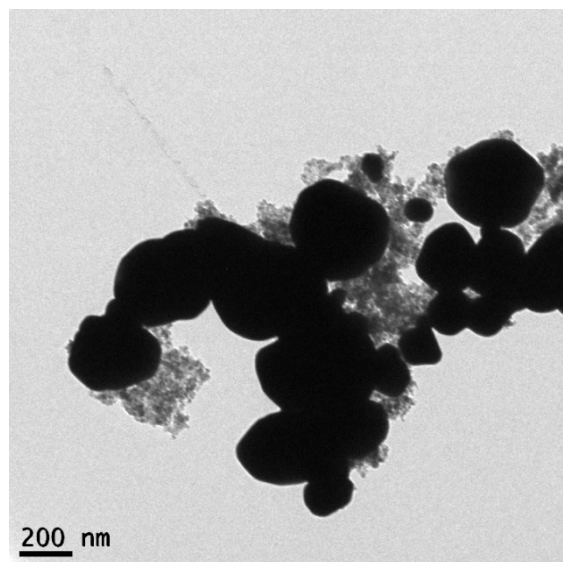

Figure S10. TEM image of commercially available gold coated magnetic nanoparticles acquired from Creative Diagnostics
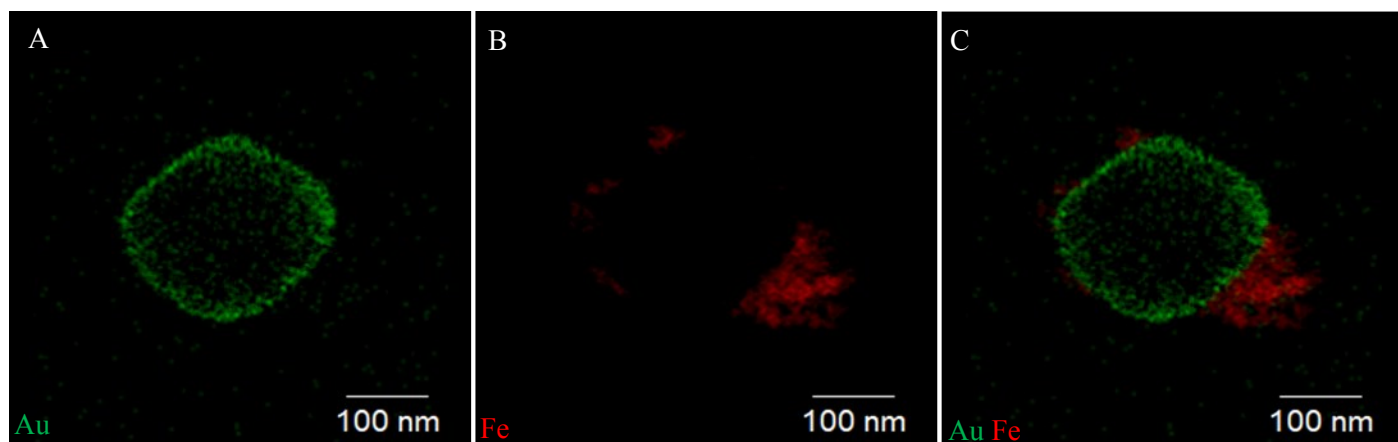
Figure S11. EDX map of the elements A) gold B) iron and C) merged gold and iron of the commercial gold coated magnetic nanoparticles
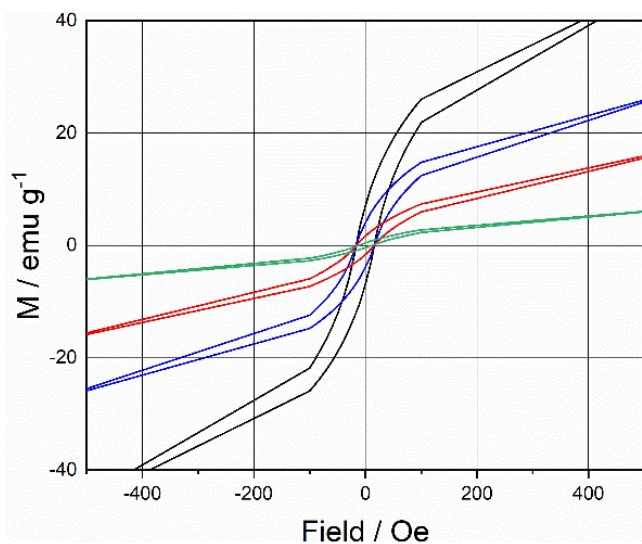

Figure S12. SQUID magnetometry measurements of magnetization behaviour of (black) iron oxide superparamagnetic nanoparticles, (blue) silica coated conglomerates of superparamagnetic nanoparticles, (red) gold coated conglomerates of superparamagnetic nanoparticles, (green) commercial gold coated magnetic nanoparticles
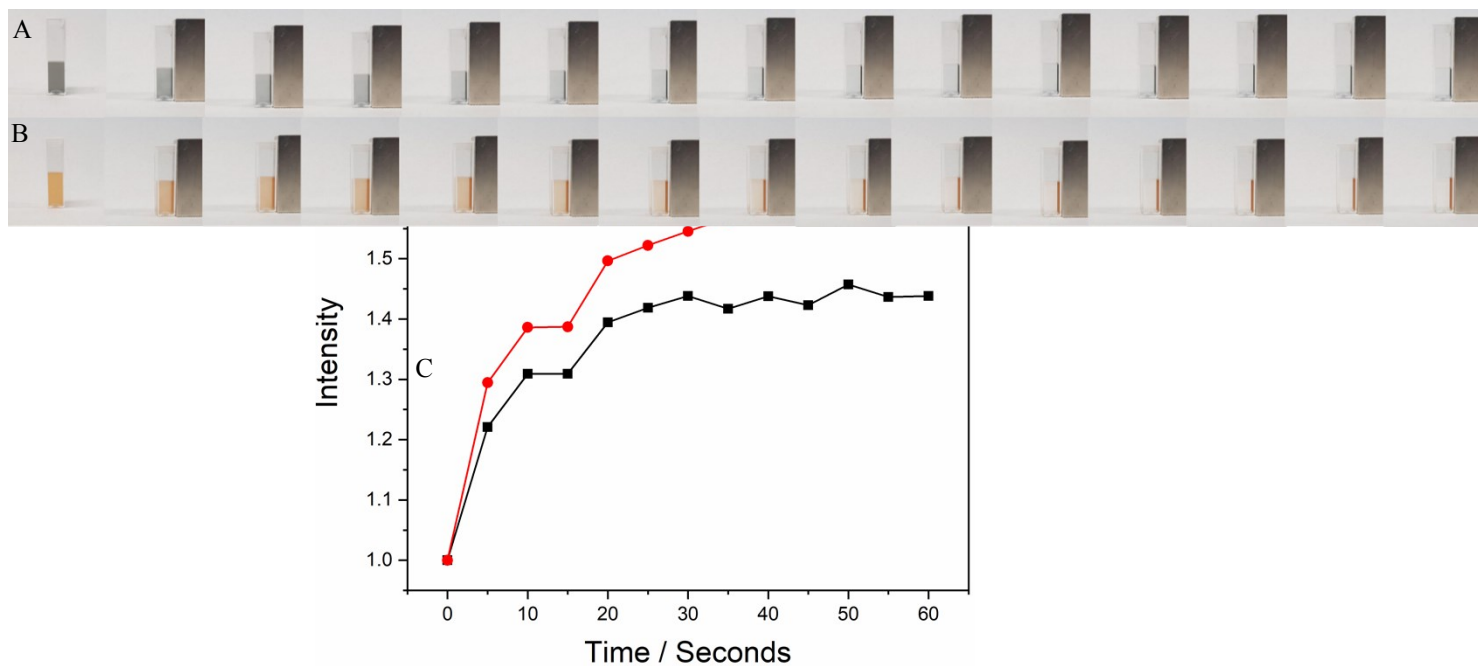
Figure S13. The sequence of images taken by an interval of 5 seconds of A) gold coated conglomerates of superparamagnetic nanoparticles, B) commercial gold coated magnetic nanoparticles and C) Graph of intensity vs time as (red) gold coated conglomerates of superparamagnetic nanoparticles and (black) commercial gold coated magnetic nanoparticles respond to a magnet
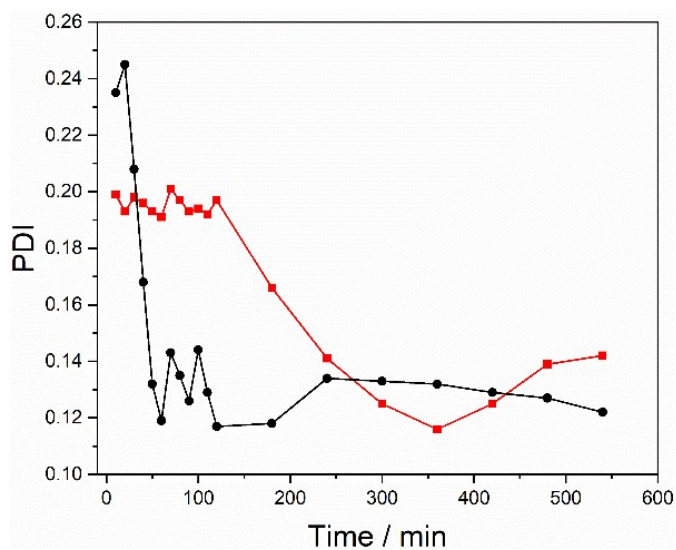

Figure S14. Variation of polydispersity index over time (red) gold coated conglomerates of superparamagnetic nanoparticles and (black) commercial gold coated magnetic nanoparticles
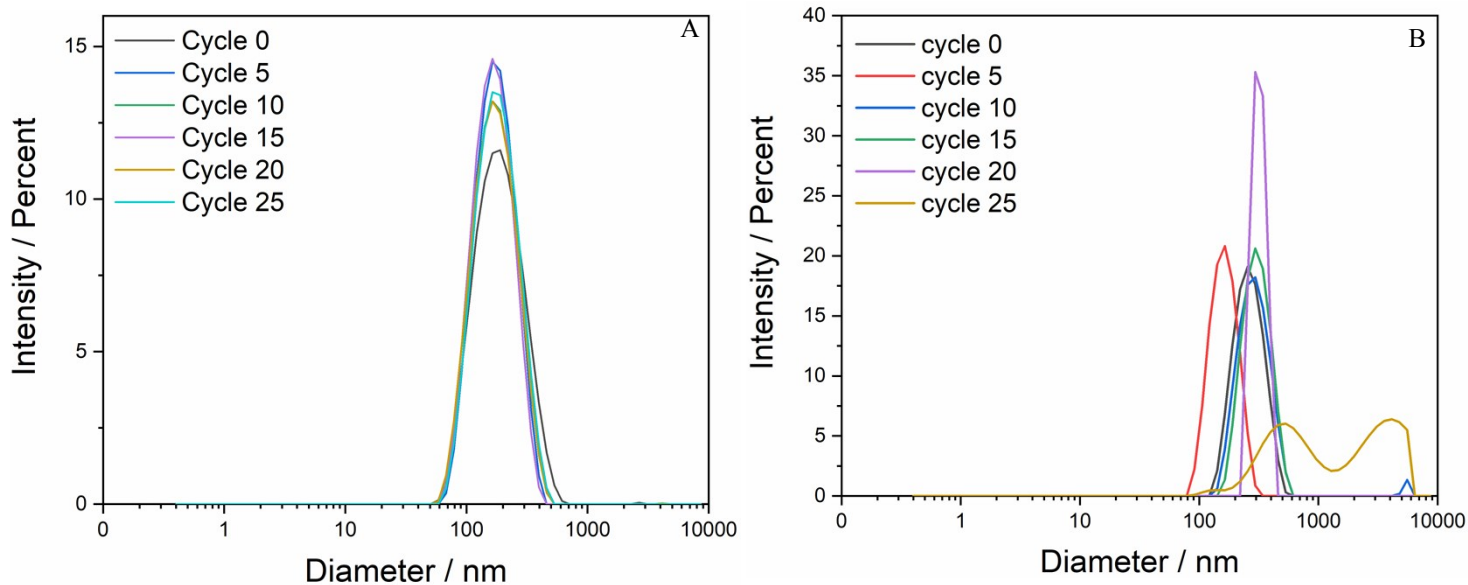
Figure S15. Dynamic light scattering (DLS) measurements of stability behaviour of (A) gold coated conglomerates of magnetic nanoparticles and (b) commercial gold coated magnetic nanoparticles after collecting by a magnet and redispersion by sonication
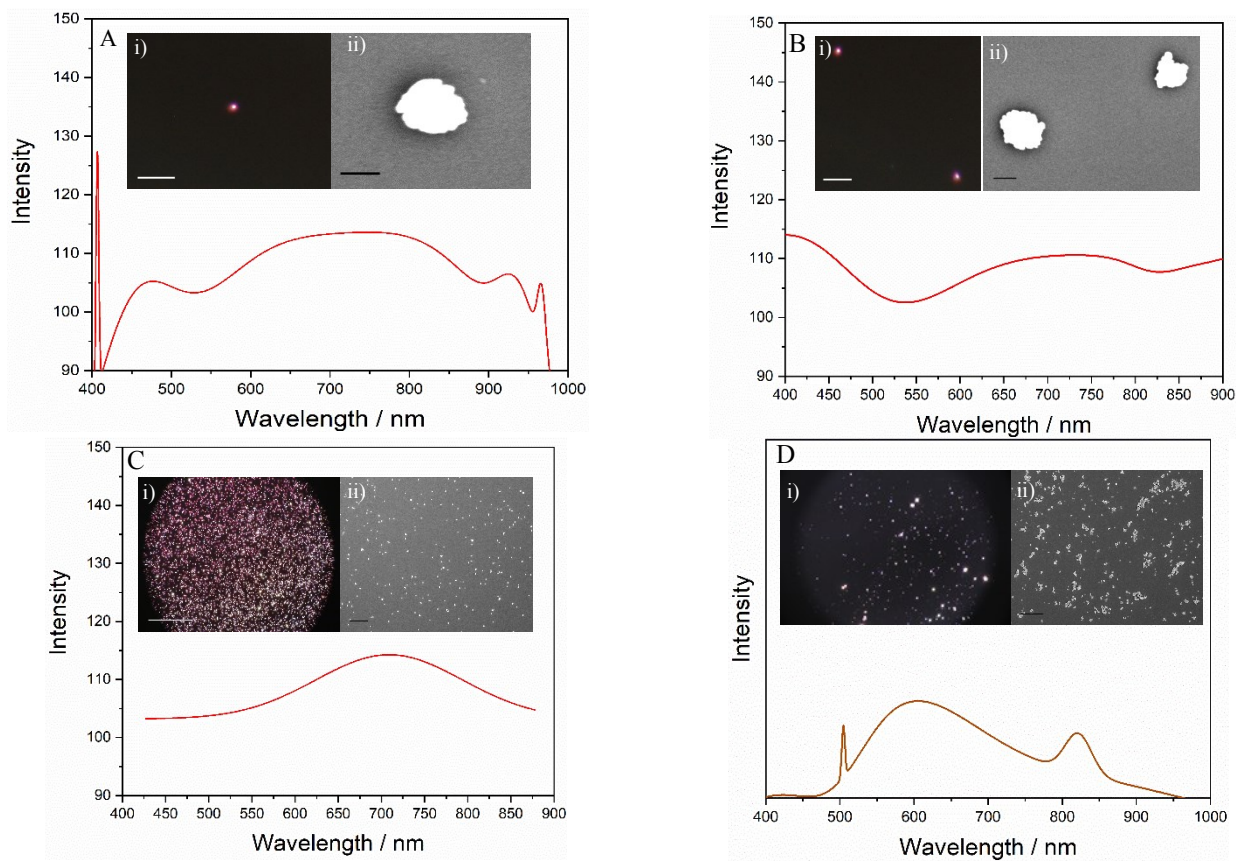

Figure S16. A) Single-particle dark-field spectroscopy of a gold coated conglomerates of superparamagnetic nanoparticle, Inset shows i) dark field microscopy image of a gold coated conglomerates of superparamagnetic nanoparticles, scale bar 500 nm and ii) corresponding SEM image of the gold coated conglomerates of superparamagnetic nanoparticles, scale bar 100 nm. and B) particle dark-field spectroscopy of two gold coated conglomerates of superparamagnetic nanoparticles, Inset shows i) dark field microscopy image of numerous gold coated conglomerates of superparamagnetic nanoparticles, scale bar 500 nm and ii) corresponding SEM image of the gold coated conglomerates of superparamagnetic nanoparticles, scale bar 100 nm. C) particle dark-field spectroscopy of numerous gold coated conglomerates of superparamagnetic nanoparticle, Inset shows i) dark field microscopy image of numerous gold coated conglomerates of superparamagnetic nanoparticles, scale bar 500 nm and ii) corresponding SEM image of the gold coated conglomerates of superparamagnetic nanoparticles, scale bar 5 μm and D) particle dark-field spectroscopy of commercial gold coated magnetic nanoparticles, inset shows i) dark field microscopy image of commercial gold coated magnetic nanoparticles ii) Corresponding SEM image of the commercial gold coated magnetic nanoparticles and
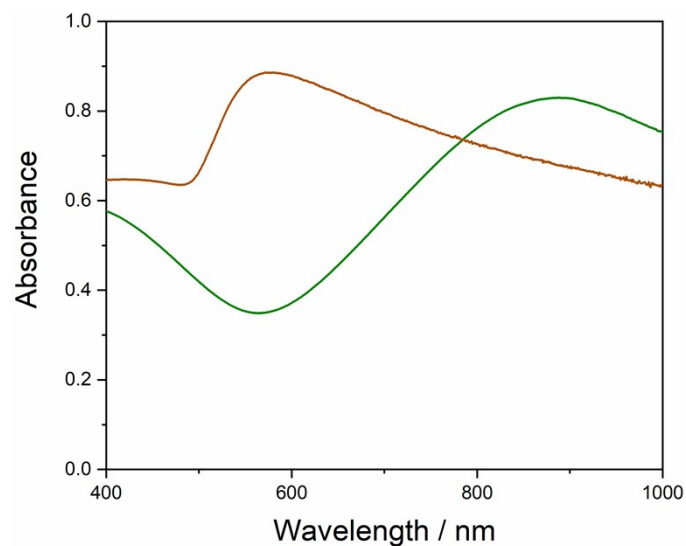
Figure S17. UV-Vis spectra of (green) gold coated conglomerates of superparamagnetic nanoparticles and (brown) commercial gold coated magnetic nanoparticles
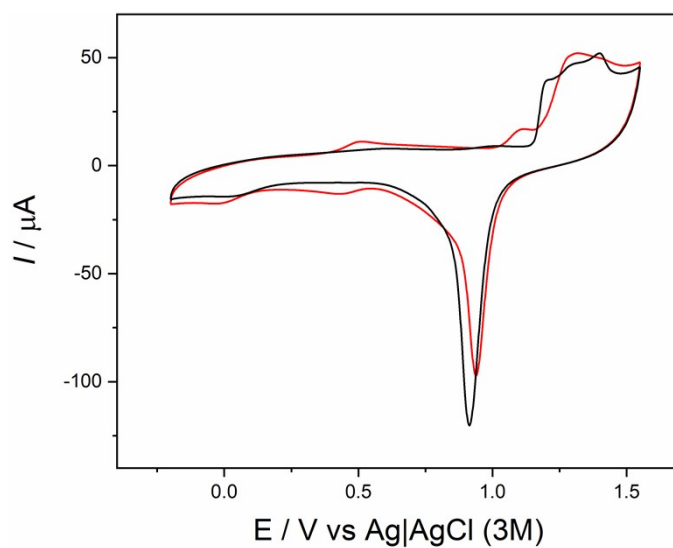

Figure S18. Cyclic voltammograms of bare gold foil (black) and commercial gold coated magnetic nanoparticles (red) in the aqueous solution of 50 mM H_2SO_4 at 0.1 Vs^{-1}

Matlab script

```
[file,path] = uigetfile(' *.jpg',...
    'Select One or More Files', ...
    'MultiSelect', 'on');
selectedfile = fullfile(path,file);
im=imread(selectedfile);
BW = im(:,:,3);
```

```matlab
figure()
imshow(BW)
hold on
u=gca;
roi=drawrectangle(u);
positionroi=roi.Position;
waitfor(gcf)
hold off
cropim=imcrop(BW,positionroi);
meanintensity=median(cropim(:));
answer = questdlg('Are there further images?', ...
    'Options', ...
    'Yes,No');
i=2;
while(strcmp(answer,'Yes')==1)
  [file,path] = uigetfile(' *.jpg',...
   'Select One or More Files', ...
   'MultiSelect', 'on');
        selectedfile = fullfile(path,file);
        im=imread(selectedfile);
        BW = rgb2gray(im);
        figure()
        u=gca;
        imshow(BW)
        roi=drawrectangle(u,'Position',positionroi);
        waitfor(gcf)
        hold off
        cropim=imcrop(BW,positionroi);
        meanintensity(:,i)=mean(cropim(:));
        answer = questdlg('Are there further images?', ...
            'Options', ...
            'Yes,No');
        i=i+1;
end
```