Supplementary Information for

Design of a Microfluidic Device for Alginate Hydrogel-based Cell Encapsulation

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MatLab code used for LIVE-DEAD analysis

```
function LDQuant

%filen: file name of the input image, should be a color image.

%# build a list of file names with absolute path
fPath = uigetdir('.', 'Select directory containing image files');
if fPath==0, error('no folder selected'), end
%You can change the next line to use different file formats, or make an
%input argument where you specify the file format.
fNames = dir( fullfile(fPath,'*.*tif*') );
fNamesOnly = {fNames.name};
fNames = strcat(fPath, filesep, {fNames.name});
xlsfilename = strcat(fPath, filesep, 'liveDead Ratios');

%# process each file
for i=1:length(fNames)

    filen = fNames{i};

    %Reading image to a matrix
    img=imread(filen);

    %Draw the red and green channels
    imgR(:,:)=img(:,:,1);
    imgG(:,:)=img(:,:,2);

    %Find circles
    % Change the second argument of the imfindcircles function to change
    % the size of detected circles.

    [centersR, radiiR] = imfindcircles(imgR, [4,10], 'ObjectPolarity',
'bright', 'Sensitivity', 0.97, 'EdgeThreshold', .22);
    numDead = length(centersR);

    [centersG, radiiG] = imfindcircles(imgG, [5,15], 'ObjectPolarity',
'bright', 'Sensitivity', 0.97, 'EdgeThreshold', .22);
    numLive = length(centersG);

    %Save a copy of the image with circles drawn
```

```
    h = figure; set(h, 'Visible', 'off')
    imshow(img)
    viscircles(centersR, radiiR, 'color', 'red');
    viscircles(centersG, radiiG, 'color', 'green');
    saveas(h, strcat(filen,' counted.tiff'), 'tiff')

    %Store the data
    data(i, :) = [numLive numDead];

    %Clear the data
    clear centersR centersG numLive numDead radiiR radiiG imgR imgG
end

%Export XLS
xlswrite(xlsfilename, data, 1, 'B2');
xlswrite(xlsfilename, transpose(fNamesOnly), 1, 'A2');
xlswrite(xlsfilename, {'Num Live' 'Num Dead'}, 1, 'B1');
```

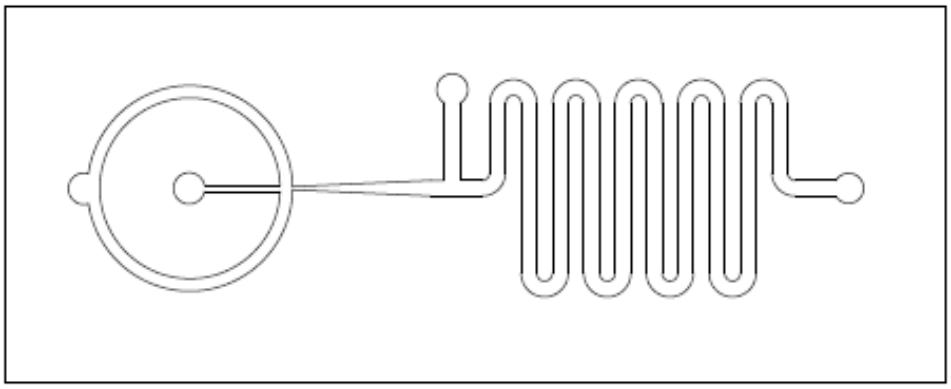

Figure S1. Dripping regime MFD design. Inlets *(i)-(iv)* are positioned identically to the RPI device shown in Fig. 1b of the main text. Note that the channel immediately following the intersection of the oil and alginate is narrow to promote single-file droplet formation through dripping.

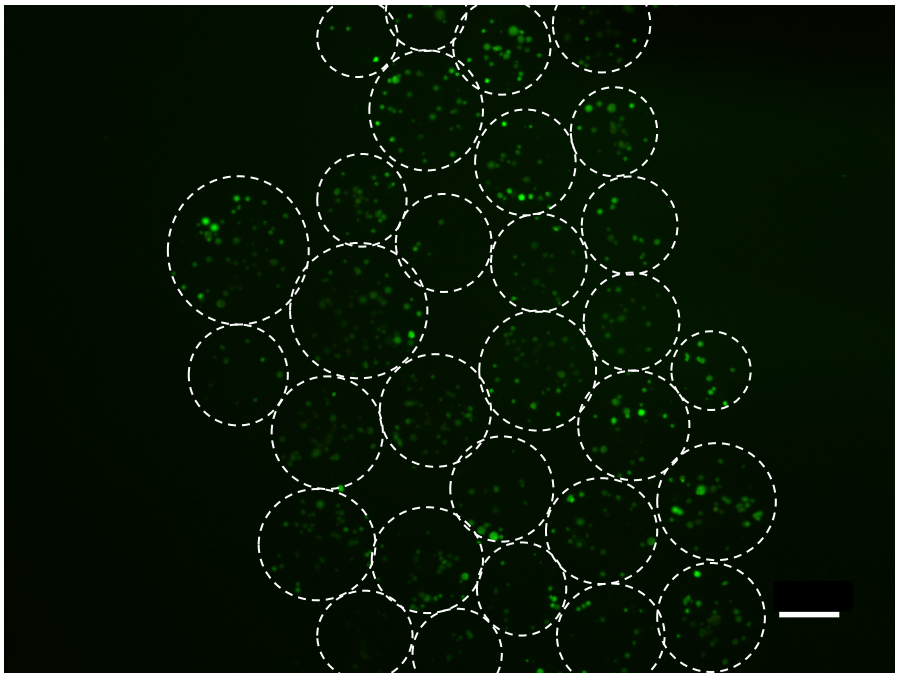

Figure S2. LIVE-DEAD stained image of bone-marrow-derived MSCs on day 21 after encapsulation. Dashed lines are bead outlines determined from a bright-field image of the same sample. Green indicates live cells and red indicates dead cells. Scale bar represents 100 μm.