Supplementary Figures

Figure S1

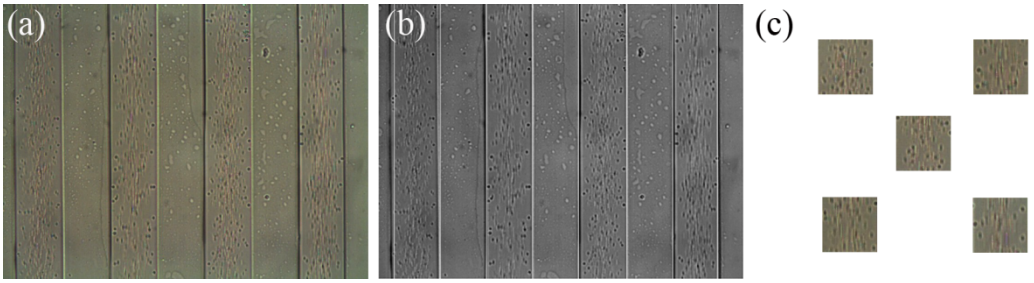

Fig. S1 (a) Image of the part of the straight channel of the 40th squarewave structure in group (I). The image dimensions are 800 μm×600 μm. The width of the channels is 100 μm. (b) Eight channel walls were found and shown on the gray image (vertical white lines) and (c) five 90 μm×90 μm areas inside the channel were randomly cropped by running program "crop.m" and "findedge.m".

Figure S2

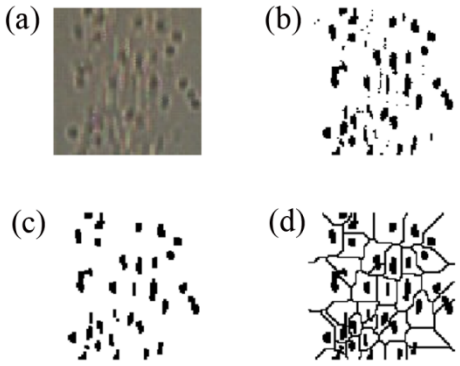

Fig. S2 (a) The original cropped image; (b) binary image; (c) image after denoising; (d) marker-controlled watershed segmentation

Scripts

"crop.m"

```
clear all
result=[];
Imge=imread('filename.jpg');
Img=double(rgb2gray(Imge));
y=findedge(Img);
result=[result;y];
result=result
I=randperm(500);
Im=Imge(I(1):I(1)+89,result(5)+10:result(5)+99,:);
```

```
figure,imshow(Im);
imwrite(Im,'test.bmp')
```

“findedge.m”

```
function result=findedge(Img)
[m,n]=size(Img);
Img_sobel=edge(Img,'sobel');
Img_hist=sum(Img_sobel,1);
      threshold=150;
Img_hist=Img_hist-threshold;
Img_hist(find(Img_hist<0))=0;
lie=[];
    for i=2:n-1
          if Img_hist(i)>Img_hist(i-1)&Img_hist(i)>=Img_hist(i+1)
              lie=[lie,i];
          end
    end
 if length(lie)==0
        sprintf(strcat('The threshold now is ',num2str(threshold),'.Please decrease the
threshold !'))
        result=[];
        return
 end
[his,b]=sort(Img_hist(lie));
num=8;
nn=length(b);
if nn>=num
      b=b(nn:-1:nn-num+1);
end
 lie=lie(b);
 histmaxlie=lie(1);
moni=[histmaxlie];
 a=histmaxlie-100;
 while(a>0)
          moni=[a,moni];
          a=a-100;
 end
 a=histmaxlie+100;
 while(a<=n)
        moni=[moni,a];
        a=a+100;
 end
```

```
revised=[];
 unrevised=[];
 for i=1:8
       [minn,min_num]=min(abs(lie-moni(i)));
       if minn<20
            moni(i)=lie(min_num);
            revised=[revised,i];
       else
            unrevised=[unrevised,i];
       end
 end
len=length(revised);
if   len<8

meann=floor(sum(moni(revised(2:len))-moni(revised(1:len-1)))/sum(revised(2:len)-re
vised(1:len-1)));
       ll=8-len;
       for i=1:ll
             [minn,min_num]=min(abs(revised-unrevised(i)));
              dd=moni(revised(min_num))+(unrevised(i)-revised(min_num))*meann;
                 if dd<=n & dd>0
                       moni(unrevised(i))=dd;
                 end
       end
 end
 aa=find(moni<2);
 if length(aa)>0
       moni(aa)=800;
       moni=sort(moni);
 end

 result=moni;
 Img(:,moni)=255;
 figure,imshow(mat2gray(Img));
 return
```

“cellcount.m”

```
close all;clear;
img_rgb=imread('test.bmp');
img_yuv444=rgb2ycbcr(img_rgb);
gray = img_yuv444(:,:,1);
[m,n]=size(gray);
h=imhist(gray,256);
```

```
img_mean = mean(mean(gray));
sum = 0;
for i=1:m
    for j=1:n
        sum = sum + (double(gray(i,j))-double(img_mean))^2;
    end
end
img_std = sqrt(sum / m /n);
img_sm = img_std/img_mean;

w0=0;w1=0;w2=0;w=0;sum0=0;sum1=0;sum2=0;sum=0;MaxSd=0;
for i=1:256
    sum = sum+i*h(i);
    w =w+ h(i);
end
for i=1:255
    w0 = w0+h(i);
    sum0 = sum0+i*h(i);
    mean0=sum0/w0;
    w1=0;w2=0;
    sum1=0;sum2=0;
    for j=i+1:256
        w1 = w1+h(j);
        w2 = w-w0-w1;
        if w1==0
            continue;
        end
        if w2==0
            break;
        end
        sum1 = sum1+j*h(j);
        mean1=sum1/w1;
        sum2 = sum-sum0-sum1;
        mean2=sum2/w2;
        sd=w0*(mean0-sum)^2+w1*(mean1-sum)^2+w2*(mean2-sum)^2;
        if (sd>MaxSd)
            MaxSd=sd;
            Thresh1=i;
            Thresh2=j;
        end
    end
end

if img_std > 5
```

```
        k=0.5;
        s=2;
else
        k=2;
        s=3;
end
Thresh1 = Thresh1 + k*(img_std - 5) ;

Thresh1 = (Thresh1-1)/256;
Thresh2 = (Thresh2-1)/256;

img=im2bw(gray,Thresh1);
figure;
subplot(221);imshow(img_rgb);
subplot(222);imshow(img)

se=strel('square',s);
img=imdilate(img,se);
img=imerode(img,se);
img=imdilate(img,se);
img=imerode(img,se);
subplot(223);imshow(img);

D=bwdist(img);
L=watershed(-D);
w=L==0;
img2=img & ~w;
subplot(224);imshow(img2);

[L2,num]=bwlabel(L,8);
num
```