Electronic Supplementary Material (ESI) for Soft Matter.

Supporting Information

Water-oil Janus emulsions: microfluidic synthesis and morphology design

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When simulated,the only thing we have to do is to input the interfacial tensions and the volume ratio of water to ETPTA.Then presss Run button of the matlab,the Janus morphology and the corresponding seperating angle($\alpha' = 180^{\circ} - \alpha$)would be calculated.The data of the interfacial tension is measured by the pendent drop method in the instrument(OCAH200, DataPhysics Instrument GmbH, Germany).The volume ratio is according to the flow rates ratio adjusted by the micro-syringe pumps (LP01-1B, Longer Precision Pump Co. Ltd.) The code of matlab is written originally according to the theroy.It is shown as follows.

```
clear;

clc;

format long

digits(8)

O=[3.53,4.12,6.13];%[Interfacial tension between:ETPTA/Paraffin,W/Paraffin,ETPTA/W]

q=1;%[volume ratio of water to ETPTA]

a=acos(0.5*(O(1)^2+O(3)^2-O(2)^2)/(O(1)*O(3)));

b=acos(0.5*(O(1)^2+O(2)^2-O(3)^2)/(O(1)*O(2)));

c=acos(0.5*(O(2)^2+O(3)^2-O(1)^2)/(O(3)*O(2)));
```

```
J1=a*180/3.14;
J2=b*180/3.14;
J3=c*180/3.14;
x0=[2,1.5,pi/4,pi/4,pi/4];%Initial Value
opt=optimset('MaxFunEvals',10000,'MaxIter',10000);
[x1,fv1,ef1,out1]=fsolve(@exam314,x0,opt,q,c,b);
if ef1==1
h=sin(x1(3)-x1(4))/sin(x1(3));
[X,Y,Z]=sphere(30);
X1=X;
Y1=Y;
Z1=Z;
h0=cos(x1(4));
surf(X1,Y1,Z1,'facealpha',1,'linestyle','-');
hold on
X2=x1(1)*X;
Y2=x1(1)*Y;
Z2=x1(1)*Z+h;
surf(X2,Y2,Z2,'facealpha',1,'linestyle','-');
hold off
h1=sin(x1(4)-x1(5))/sin(x1(5));
```

```
axis equal,axis off

view(20,10)

q

angle=[J1 J2 J3] % [The angle results of α , β and δ ,α' = 180 − α ]

R=[x1(1) 1 x1(2)]

h=[h 0 -h1]

w=abs(cos(acos((1+(-h1)^2-(x1(2))^2)/(2*abs(-h1)))))

colormap([0 0.7 0;1 0 0])

caxis([w-5 w+5])    %å□¯èƒ½å-˜åœ¨è¯¯å·®ï¼Œéœ€è¦□å¾®è°ƒï¼Œçº?/30%

else

x0=[1,1.5,pi/4,pi/4,-pi/4];

[x2,fv2,ef2,out2]=fsolve(@Janus,x0,opt,q,c,b);

h=sin(x2(3)-x2(4))/sin(x2(3));

[X,Y,Z]=sphere(30);

X1=X;

Y1=Y;

Z1=Z;

h0=cos(x2(4));

surf(X1,Y1,Z1,'facealpha',1,'linestyle','-');

hold on

X2=x2(1)*X;

Y2=x2(1)*Y;
```

```
Z2=x2(1)*Z+h;

surf(X2,Y2,Z2,'facealpha',1,'linestyle','-')

h1=sin(x2(4)-x2(5))/sin(x2(5));

hold off

axis equal,axis off

view(20,10)

q

angle=[J1 J2 J3]

R=[x2(1) 1 x2(2)]

h=[h 0 -h1]

w=abs(cos(acos((1+(-h1)^2-(x2(2))^2)/(2*abs(-h1)))))

colormap([1 0 0;0 0.7 0])

caxis([w-5 w+5])

end

function y= Janus(x,q,a,b)

y(1)=2*x(1)^3*(1-cos(x(3)))-x(1)^3*cos(x(3))*sin(x(3))^2-2*x(2)^3*(1-cos(x(5)))+x(2)^3*cos(x(5))*sin(x(5))^2-
q*(2*(1+cos(x(4)))+cos(x(4))*sin(x(4))^2+2*x(2)^3*(1-cos(x(5)))-x(2)^3*cos(x(5))*sin(x(5))^2);

y(2)=x(4)+b-x(3);

y(3)=x(5)+a-x(4);

y(4)=x(1)*sin(x(3))-sin(x(4));

y(5)=x(2)*sin(x(5))-sin(x(4));
```